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ROCK GARDENS

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ROCK GARDENS

HOW TO PLAN AND PLANT THEM

WITH SECTIONS ON THE
WALL, PAVED, MARSH, AND WATER GARDENS

BY

A. EDWARDS

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PREFACE

DURING the last few years the popularity of the rock, water, and bog gardens has increased to an astonishing degree, and in the future these gardens will certainly find even greater favour, for of all the forms of gardening they are the most adaptable to the requirements of space and the depth of one's pocket.

I have tried to make this new work comprehensive and thoroughly practical. It tells concisely, but in detail, how the rock, water, and bog gardens should be planned and constructed, planted, and maintained. To each individual plant is devoted a paragraph, or more, showing the site, soil, treatment, and method of propagation most suitable to it. Lists of plants most adaptable to the various localities, soils, and positions are also given.

It is a book that, I hope, will prove valuable to owners of rock or water gardens, large or small, for I have endeavoured to consider the work in these gardens from every aspect, and the most exacting rock gardener should be able to turn to its pages and find an answer to any practical question he may have to solve.

THE ROCK GARDEN,
ROYAL BOTANIC GARDENS,
KEW.
1929.

A. EDWARDS,
Assist. Curator.

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CHAPTER I

THE ROCK GARDEN

THERE are few features in the garden that provide such a variety of interests in so little space as a well-planned and carefully planted rock garden. The smallest plot may contain a rock garden which will house a representative and charming collection of alpine plants; but, on the other hand, there are few features in the ordinary garden that are so neglected and so ill-understood.

It must be remembered that the chief function of the rock garden is to provide the plants grown in it with the conditions existing in their natural haunts. The alpines and high alpines are the most typical of all rock plants and are mostly natives of the high mountain crags and screes of the Alps and Himalayas. The ideal rock garden, therefore, should, as far as possible, provide the soil and climatic conditions pertaining in these regions. During the short alpine summer the plants are subjected to fierce and baking sun; many of them, therefore, have thick leaves covered with down or hair to protect them from its shrivelling rays. The roots, too, at this time need ample moisture, and this is provided by the melting of the snows on the mountain tops, whence it permeates through the scree of the moraine (*see* The Moraine Garden, p. 23). In winter, this downy foliage, which rots very rapidly if there is excessive moisture overhead or round the crowns of the plants, is protected by a blanket of snow until summer again comes round. It is obvious, therefore, that the two essential requirements of alpine plants, especially high alpines, are ample drainage for the soil in which they grow and protection from damp in winter. The former can be obtained with a little care during the construction of the rock garden (*see* p. 15), and the latter essential can be provided by the use of panes of glass and hand-lights placed over these downy-leaved plants (it is not necessary with glossy-leaved species) in winter (*see* p. 25). It is against damp, not frost, that these plants need most protection.

As mentioned above, most of the alpines have to withstand considerable drought during the short, but parching, summer months. For this reason, and because there is often but scanty surface soil, many of them have long, running roots that can penetrate deeply into crevices among the rocks and thus draw moisture and nourishment from below. Deep crevices, packed with rich soil, are, therefore, of primary importance in the rock garden. (*See* p. 15.)

The horrible mass of shiny, glazed lumps of brickwork in the cracks of which half-starved ferns and plants struggle for existence is nothing but a disfigurement. The chief uses of the rocks and stones in a rock garden are the provision of coolness for the roots and the storing of moisture in crevices for the use of the plants. But the idea that rock plants grow best in practically nothing but rock is a mistaken one. As pointed out before, a generous allowance of good soil between, amongst, and beneath the stones is essential for the healthy growth of the plants. As the function of the rocks is to provide shelter for roots, it is clearly useless to plant slabs of rock or stone perpendicularly in the soil. No protection is

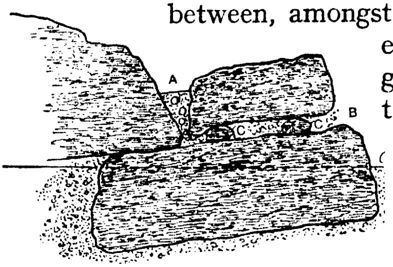


FIG. 1.—MAKING CREVICES BETWEEN THE ROCKS.

shows a vertical crevice; *B* a horizontal fissure. The small stones *C C* give space for soil between the rocks.

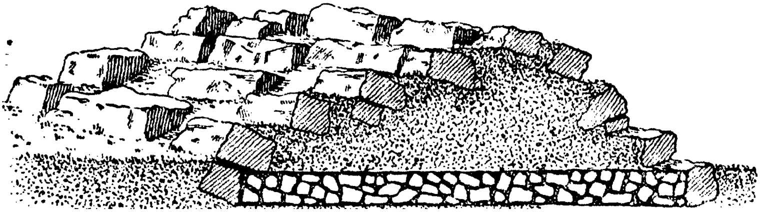


FIG. 2.—CONSTRUCTING THE ROCK GARDEN.

The rocks should be set at a uniform angle to simulate the strata of a natural outcrop of rock; they should tilt slightly backwards and the higher rocks must not overhang those below them, or no moisture will find its way into the horizontal fissures. The brick or rubble drainage is clearly shown.

afforded in this way: the roots cannot get down beneath them, and they do not preserve any moisture. Large masses of stones, two or more feet in length, should be used, where possible, and should be sunk well and firmly in the earth in a slightly slanting direction—tilted backwards, not forwards, so that the rain may trickle down to the roots of the plants.

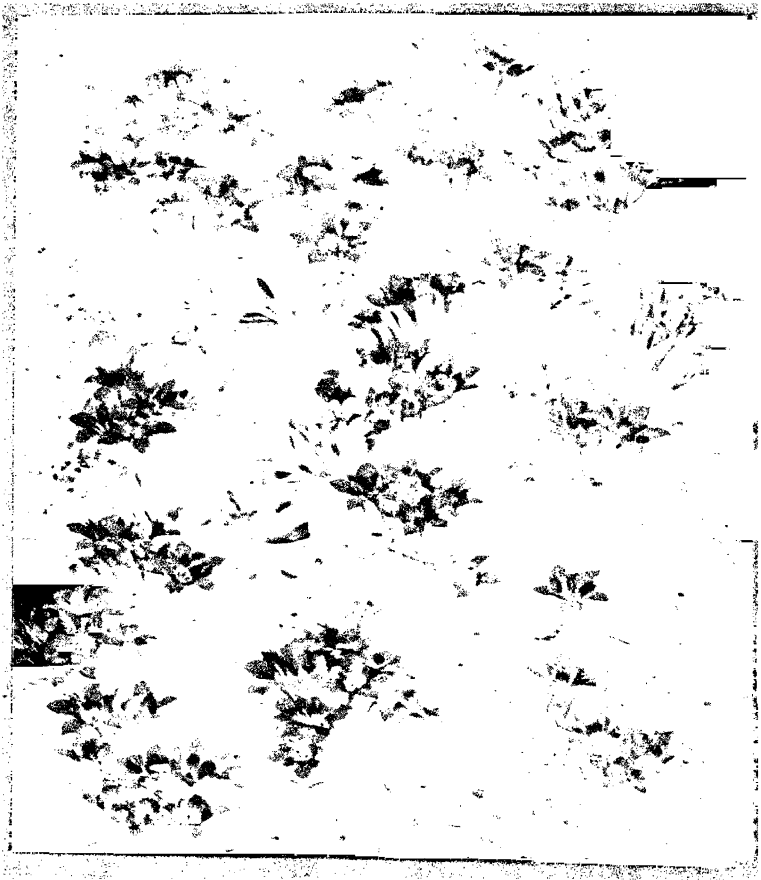
If the rocks lean forward, over the plants, the roots will be sheltered from the rain and probably parched. Although the visible portions of the rocks in the garden should be as pleasing as may be to the eye, and should all slant in the same direction to represent a natural outcrop or stratumof stone, it should never be forgotten that they are not there for the sake of picturesque effect, but to protect the roots of the plants growing among them. The slopes of the mounds in which the boulders are set must not be too steep and should be as natural in appearance as possible; there should be miniature ranges and mountain peaks, and dividing them, valleys into which spurs from the hills project. Winding paths, eighteen inches to two feet in width, with stepping-stones, should be cut through these gorges so that every part of the rock garden may be easily accessible. The pockets in which the alpines are to be planted should be irregular in shape and may vary from a few inches in diameter to as many feet across. Their surfaces must not be flat, but sloping to afford drainage. They must provide ample root-run and should be from a foot to eighteen inches in depth, and so constructed that the soil will not wash out of them. If there is any chance of the soil in the pockets becoming sodden, six to twelve inches of clinker and rubble drainage must be provided.

Soil

The great mass of rock plants, particularly the alpines, like a rich soil, even where they need little of it. It should, above all, be well drained so as to be light and porous in winter, but at the same time it must be moist and cool in summer. A soil full of coarse sand or grit, leaf-mould, and other decayed vegetable matter, mixed in some cases with old spent manure from a hotbed, is excellent for rock gardening. As a whole these plants are not faddy as to soil and most thrive well in the compost mentioned above, but some grow best in certain soils. (*See* the chapter on the cultivation of individual plants, p. 143.) For those requiring special soil conditions it is quite easy to scoop out a hollow and to substitute a little special compost.

Alpine plants in their native habitat receive a yearly top-dressing of vegetable matter from the material carried down by the melting snows, and alpines in a rock garden are all the better for a top-dressing artificially applied in imitation of this natural process.

Where rock plants are studied in their natural conditions, it will be found that in most cases the soil around the roots is completely covered by the stalks and leaves, each plant touching its neighbours, and that practically no soil is left exposed. This arrangement is of the greatest use to the plants, as by preventing the exposure of the soil to the action of sun and wind, its natural moisture is preserved, so that, so far as we can, we should provide this protection. This is, however, rather difficult to do at first, as while the plants are still small and most need protection, they are unable to cover the surface of the ground, and to plant



GENTIANA SEPTEMFIDA *Malby*

them closer together would merely mean starving and overcrowding them. In such a case the best thing to do is to cover the immediate surface of the soil with chips of stone, small enough to be easily pushed aside by a shoot, but sufficient to prevent the over-drying of the earth. In a suitable soil the plants should soon spread and clothe the surface.

Situation

As regards the situation of the rock garden, it should, where possible, have an open, sunny position, away from walls and trees. The latter will prevent the circulation of fresh air so necessary to alpine plants and, in addition, the roots will soon find their way into the soil provided for the rock plants, and rob it of its nourishment. The rock garden always looks best where it has not to bear contrast with any formal arrangement of garden or shrubbery; a wild and "natural-looking" site, and, where possible, one where the natural rock of the district crops up here and there, is the most favourable.

Suitable Stone

In making the garden the stone of the district should always be used where possible, although it is advisable in the dry districts in the east and south of Great Britain to use a porous sandstone, as this provides a kindlier home for the roots and a cooler stone for the foliage in the long sunny days. The more rugged limestone of the Cheddar and Yorkshire hills has a most natural weather-worn appearance and the cracks and crevices provide a cool root-run for the plants in the wetter areas of the north and west coasts. The stone chosen should be porous so as to be able to absorb ample moisture: hard, impermeable rocks, like granite, should, therefore, be avoided. Any natural rock formation should be used as a basis, the garden being constructed round and among it, the mounds or banks required being built up, not on heaps of stones, but of good soil, with big stones set in it here and there, the surface being set fairly thickly with stones of varying sizes, but all of the same kind. Let the stones be rugged and as massive as the size of the rock garden and one's means will warrant. Here and there set in larger stones, sometimes touching and forming ledges and knolls so that, when these are filled with plants, they give the whole the appearance of solidarity and the bold outlines of natural stratification. It is essential that there shall be no spaces and hollows under and around the stones, and that the earth shall be well bedded round them.

The Paths

The paths through and near the rock garden should not be too formal, and their edges should blend softly with the surrounding vegetation. This may be done by making the path of flat rocks or broken paving-stones set in good soil, with small plants at the edges placed actually between the stones, and encouraged to spread over all those parts of the path not habitually walked upon. Even upon the edges of gravel walks this softening process may very well be carried out, if suitable plants are chosen. The alpine toadflax will do well in such a position, on gravel, as will most of the dwarf sedums or stonecrops. The great thing to aim at in the rock garden is the complete covering of the space with plant life, the only bare spots being a few actual rock projections.

Crazy Paving.—Crazy paving, which is the most satisfactory type of path for the rock garden, must be well and evenly laid, otherwise it is very unpleasant to walk on, and will always be giving trouble because of the loosening and rising of the stones. The course of the path must be first marked out with stakes and the surface soil removed to the depth of from nine to twelve inches, if there is no lack of materials to fill it; the wider the path, the deeper the excavation necessary. The nature of the soil also affects the depth of excavation; in heavy clay at least twelve inches should be removed, in light soil nine inches will suffice.

There is a point that must be stressed here, and that is the importance of eradicating all perennial weeds, especially those with long, creeping roots, from the soil at the bottom and sides of the path. If this is not done, all kinds of weeds will soon make their appearance in the new path, and will be very difficult to get rid of. Weed-killer *will* kill these perennial weeds, but it takes three or four years to effect a thorough clearance. From one-third to one-half the depth excavated for the path must be filled up with rough stones, brickbats, clinkers from the brickfields, slag and scoriæ from the ironworks, or any coarse, hard rubbish that can be gathered together; the greater part of the remainder must then be filled up with coarse gravel, shingle, etc., which may be mixed with a little earth to give consistency to the whole. The correct level for the crown of the path can be marked by wooden pegs driven in to the right depth. Allow the path to set for a few days before using it.

The one great aim is to afford a sound and level surface for the paving, and the straight-edge and spirit-level will, therefore, be constantly in use with a view to this. The foundations must be rammed and rolled absolutely firm; if there is the slightest fear of any settlement in the base, as may well happen in clay, an inch layer of cement in which to lay the paving had better be put down. Over the hard core spread a two-inch layer of sand or ashes, if cement is not used. Make this quite level and then lay down the paving, fitting the pieces carefully together and filling up the gaps with the smaller fragments. No crevices of much more than an inch in width should be left between the stones, or the path will not remain firm. Where there is likely to be much traffic, the main stones, and all those at the sides of the walk, should be set in mortar. This will keep it firm. Fill the interstices with sandy loam, so that rock plants, such as saxifrages, thymes, and other creepers and trailers, may be planted. (*See* The Paved Garden, p. 113.)

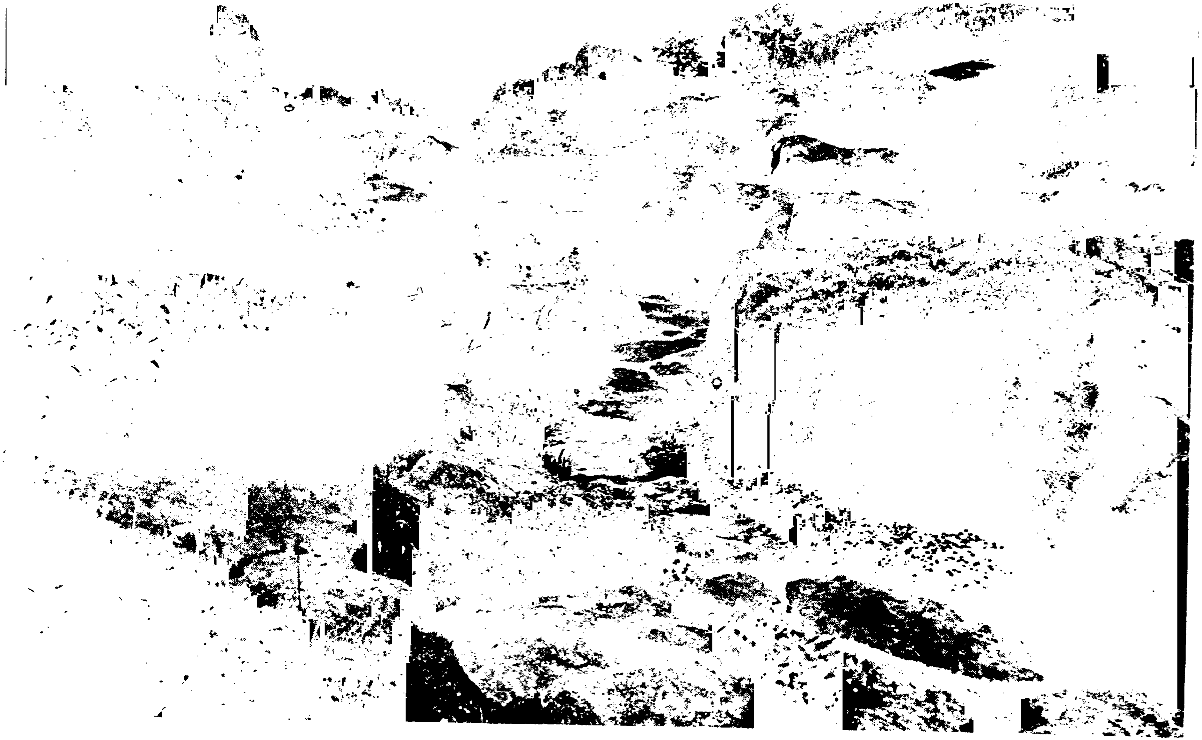
The Selection of Plants

The selection of plants for the rock garden gives rise to the very vexed question of what are really suitable. Should only high alpines be included? Are all herbaceous perennials worthy inmates? What about the dwarf trees and shrubs? Are annuals allowable? Ask half a dozen rock-garden enthusiasts these questions, and you will get a different answer from each of them. As to herbaceous perennials and shrubs, height is a deciding factor, except in big rock gardens, where some of the largest of them will not come amiss in the more remote and out-of-the-way spots. Dwarf annuals, as a whole, would appear to be allowable as temporary subjects in new and sparsely-furnished gardens, while certain species are so charming and appropriate that they might well become permanencies. However, it is impossible to dogmatize on such a subject, and the final decision can quite well be left to the personal likes and dislikes of the owner of the rock garden. There are, however, several other points to be borne in mind. We should aim at having bloom over the longest possible period of the year. In this connection some of the smaller-growing bulbs (*see* List of Bulbs, p. 59) which bloom in the winter and early spring are invaluable, while those later autumn-flowering alpines, such as *Lithospermum prostratum* (Gromwell), *Vittadenia triloba*, and *Zauschneria californica*, furnish colour long after the great majority of rock plants.

Some of the stronger growers soon overrun the rock garden and smother other plants less luxuriant, perhaps, but more beautiful and useful. These vigorous plants must, therefore, be limited in number and those of this nature that are chosen must be sternly cut back and kept in check. To add interest to the rock garden, as many of the various genera as possible should be selected, but the garden must never be overcrowded. Bulbs are often overlooked when planting the rock garden. This should not be, for few sights are more lovely than some of the smaller-

[Malby

A natural rock garden of majestic proportions.



A good example of rock garden construction [H. N. King growing bulbs blooming above a carpeting of *Acæna microphylla*, *Globularia nana*, *Arenaria balearica*, or other dwarf trailer. For a selection, *see* list on p. 59.

In a newly-constructed garden there are sure to be some bare spaces for a year or so. Here it is that some of the dwarf annuals can be made to play such a useful part in filling the unavoidable gaps. The profusion and brightness of the bloom of most of these little plants, in addition to their value as fill-ups, justifies their position in the garden.

Planting

Like all other plants, rock plants vary in their characteristics, habits, likes and dislikes. Some have a rounded growth, others are prostrate ; some love the sun, others the shade ; a dry and sandy soil suits many, others must have a moist, rich loam. In planting, therefore, the varying types should be grouped together according to habits and requirements, so that all shall have, as far as is possible, the conditions best for them.

It is always advisable to plant three or more specimens of a certain species or variety together, so as to form broad masses of colour rather than the patchwork effect caused by the indiscriminate planting of single subjects. The size of the groups naturally depends on the extent of the rock garden. In small gardens it may be wise to plant only single specimens.

There is yet another point to settle in this connection. It will be necessary to decide whether it is preferable to plant a comparatively limited number of fast-growing species that will spread rapidly over the bare spaces and quickly furnish the rock garden, or whether it is better to plant a greater number of plants, choicer in bloom, may be, but less rampant in habit. In the first case, a good show of bloom should be available in a year or so, but if the latter method is selected, patience will be needed for two or three years at least. The latter is the correct and better way, for the greater number of species planted will provide vastly more interest and pleasure. In any case, too many plants of the rampageous type should not be planted or they will soon choke the slower-growing specimens living among them. Choice plants will need constant attention, or they are sure to be overwhelmed by their more vigorous neighbours.

Rock plants should be planted out either in the spring, or better still, in the early autumn, but not later than September, since the roots make but little growth after that month, and the plants are liable to be washed out of the earth by heavy rain, or lifted from the soil by the action of frost. It is more usual to plant out alpines in the spring, but, as already stated, it is better to do it in the late summer, after they have bloomed, at which period their roots put forth new shoots and are more easily able to obtain a footing and to secure nourishment. If the plants are moved in spring, they are almost immediately subjected to the strain of flowering and get little support from their roots. This ought to be risked, however, in and around our larger cities, as many of the rarer alpines find a difficulty in withstanding the winter's fog and damp, even when well established. If care is taken, all alpines can be planted out at any time between early April and the end of September. They should be planted very firmly with the soil rammed well down around the roots, which should be carefully spread out ; never should they be cramped. The plants must be thoroughly watered after planting. Specimens from pots may, of course, be planted at any time, provided a sufficient " ball " of soil from the pot is allowed to remain round the roots, and the weather is neither too dry nor too wet.

Do not plant out in very dry weather, as it will be extremely difficult to provide the roots with sufficient moisture; likewise, planting when very wet will make the soil become caked so hard that the fibrous roots will have difficulty in penetrating it and finding nourishment. After planting, especially in the case of the choicer alpines, small stone chippings should be spread over the surface of the soil around the plants. This will prevent excessive evaporation.

When planting in a crevice it is essential that there shall be no air-pocket at the bottom ; this would drain all moisture from the roots and parch them. To avoid this, first ram plenty of good gritty soil deeply into the crevice and make sure that the bottom is well filled, then scrape out some of the mould at the top and set the plant in firmly, pressing the soil well down round the roots, and fix it in tightly by means of a smaller wedge of stone. Care should be taken that shade-lovers, like *Aquilegias* and *Hepaticas*, are given congenial situations ; plants which prosper in the sun, as *Alyssums, Arabis, Zauschnerias*, etc., should be given the sunniest spots in the rock garden. Such plants as *Alyssums* and *Aubrietias* should be planted in the crevices among the rocks ; on the flat, lower-lying situations the *Saxifrages* and all such creeping plants will thrive ; while an occasional dwarf evergreen shrub should certainly be planted.

The Moraine or Scree Garden

Many of the more rare and fastidious of the alpines will not prosper in the ordinary rock garden. They require that the natural conditions under which they live in the wild state shall be copied as nearly as possible in the rock garden. The plants to which we refer grow on mountain slopes covered with loose stones, where the melting of the snow during summer provides them with plenty of ice-cold water and where a blanket of snow protects them during the winter. The conditions we must endeavour to reproduce are, therefore : adequate moisture for the roots in summer while the plants are growing, but at the same time good drainage ; and secondly, protection from damp in winter. The moraine is intended to provide these requirements, and can be made quite cheaply anywhere in the rock garden. Plants requiring very diverse kinds of soil may thus, with great effect, be grown in close proximity.

Making the Moraine

An ideal and natural position for the moraine would be in the sun at the lower end of a miniature valley between two rocky spurs, the gorge gradually expanding into a flat bed of scree with occasional boulders strewn over it. The extent of the moraine will vary in proportion to the size of the whole rock garden. If the latter is large, the moraine may cover an area of many square yards; on the other hand, it may be nothing more than a small, well-drained pocket or crevice filled with moraine mixture in which a single specimen is grown.

To construct the moraine, dig out about two and a half feet of the soil and make the bottom of the basin or trench slope slightly towards the front: the slope must not be too steep or the moraine will become over-dry in summer. The lower ten inches of this basin must be made water-tight by means of puddling with clay or by means of cement. Make an outlet in front, which when closed keeps about ten inches of water, but not more, in the lowest parts of the basin, while when the outlet is open no water can remain in the basin. Now cover the bottom of the trench with about ten inches of rubble, stones, or any material that will afford good drainage. Above this place another six inches or so of smaller stones roughly two inches in diameter; these will fill the gaps between the larger stones and will prevent the small grit above from sinking through and blocking the drainage. The hollow is then filled up with a mixture of stone chips and gravel. Over this again is thrown a covering, an inch or so in thickness, formed of a mixture of equal parts of ordinary garden soil, leaf-mould, and small stone chips similar to those used in frosty weather for sprinkling on wood-paved roads. Limestone or sandstone chips are excellent and easily obtained; flint chips should not be used, as they do not conserve moisture. Place a few boulders in the moraine to break up the surface and to give the plants some protection. A natural trickle of water may be led into the top of the moraine, or each day sufficient moisture may be given from a watering-can to cause an overflow from the outlet at the bottom. From November to May, when no additional moisture is needed in the moraine, the outlet should be left open.

The overflow from the moraine may be led into a small pool, which will add great charm to the rock garden, and is easy to construct while the garden is being made. In it may be grown rushes and small water plants, while the overflow from it will provide an excellent situation for bog plants or for any alpines loving plenty of moisture. When planting, the gardener should remember the conditions under which each plant lives in its native state, and should set it in the rock garden accordingly. Many plants that have proved failures in the rock garden proper will, on transplantation to the moraine, flourish.

The inhabitants of the moraine are not so rampant as many alpines grown in the rock garden proper, but for all that, the more vigorous should be kept in check. A light top-dressing of equal parts of loam, leaf-mould, and stone chips will be required in spring and again in early autumn.

Protection of Plants in Winter

Plants whose leaves are covered with fluff or down are, when in their natural haunts, usually protected from damp during the winter by a coat of snow. When they are grown out of doors in this country, they must, therefore, be given a covering of glass during the winter months: that is, from the middle of October to the beginning of March. When the plant is a small one nestling in a crevice between the rocks, it is often possible to cover it with a sheet of glass resting on the surrounding rocks; but when this cannot be done, four pieces of stiff galvanized wire should be inserted firmly in the ground and bent over at the top to hold the glass plate securely in position over the plant. If the weather is especially severe or the plant very delicate, four additional pieces of glass may be set in the soil and supported by the wires so as to form four walls protecting the plant. Sufficient space between the glass roof and the tops of the four walls should be left for adequate ventilation (but not enough to admit the rain or snow) or the plants will be liable to damp-off. Hand-lights and bell-glasses may also be used, but in all cases adequate ventilation should be provided. The frost will often raise the plants from the soil, especially those planted the previous autumn. In spring, therefore, each plant should be carefully scrutinized, and, if necessary, gently pressed down into the soil. Dead leaves must be removed from around the plants, and a top-dressing of fine, sandy loam and leaf-mould should be sifted round and close up to the crowns.

Care of the Rock Garden in Summer and Autumn

All through the summer months the rock garden must be periodically weeded and all dead flower heads should be cut away. Water the choicer species during dry spells, even in spring if very dry, and in May top-dress with a thin layer of sandy loam and leaf-mould to which a little well-decayed cow-dung has been added. By July most of the plants will have borne the best of their bloom, and many of the most vigorous, such as *Arabis* and *Aubrietia* for example, will now be pushing forth new growth and will commence to overcrowd the less rampageous inmates of the rock garden. These plants, including the shrubby subjects, should, therefore, be trimmed back, and at the same time the older portions of the plants and all dead stems and foliage should be removed. Do not, however, cut the plants back so evenly that they have the symmetrical and formal aspect of shrubs in a topiary garden ; rather endeavour to foster the wild and natural appearance of the rock garden, and where a plant is not throttling its neighbour and has ample space, let it ramble over the rocks at will. The soil should be well hoed up between the plants and any vacancies filled. At this time, too, divide the roots of plants that are to be increased and set the little plantlets in their new positions; likewise transplant any subjects that have not done well during the past season, and give them another chance in some other position and in different soil, for alpines are queer, and plants, even of the same species, will not always thrive when given identical conditions, but will sometimes flourish when given a change of some kind.

In an old rock garden it may be that plants are not doing well because the soil in the pockets and crevices in which they grow is stale or exhausted. In such cases the plants should be removed and fresh soil, of a composition to suit the plants, should be inserted. This may be done in early spring or in autumn, the latter time being preferable as the plants have then a better chance of becoming established before the flowering season. If a plant has grown too large for the pocket it occupies, it should be lifted and divided: the stronger outer crowns only being replaced.

It should be remembered that established plants, if the rock garden has been properly constructed, will need watering only after a long spell of dry weather. If in such a case watering is necessary, let the plants have a good soaking in the evening once a week rather than a mere sprinkling every day; this latter process merely draws the roots to the surface and does more harm than good.

The Propagation of Rock Plants

It is always advisable to have a few young plants coming on to replace casualties, for some alpines, especially the more choice, have a habit of dying off suddenly.

Rock plants may be increased by seed sown under glass as soon as ripe or in March, by cuttings, or by division of roots in April or September. It is better to raise alpines from cuttings or division of roots, rather than from seed, which is a lengthy and, in some cases, a difficult process.

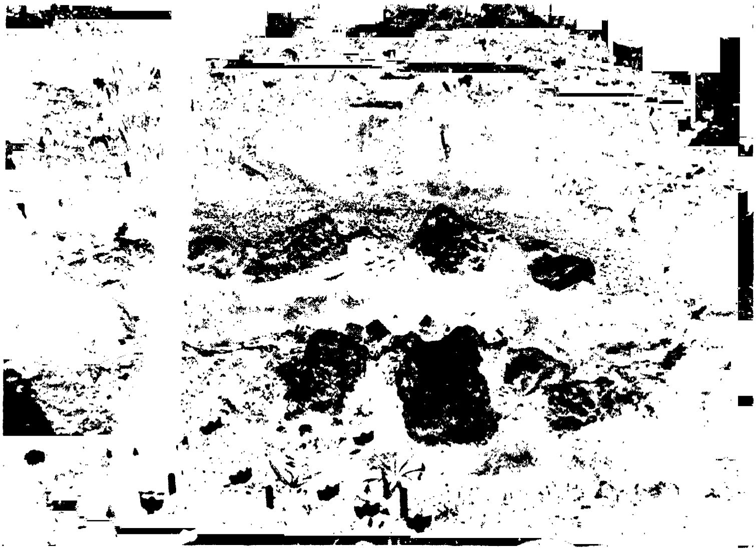
(*See* Propagation, Chapter VII.)

SOME GOOD ROCK PLANTS

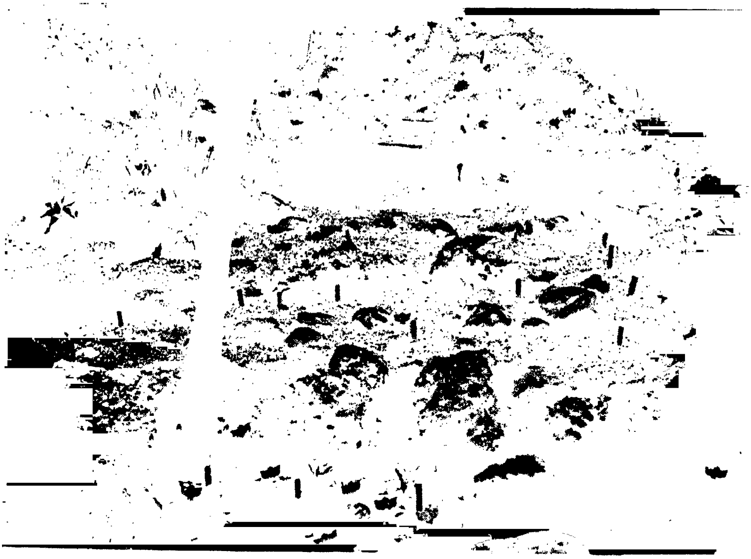
(For Notes on Culture, Species, Varieties, etc., *see* Alphabetical List of Plants, p. 143.)

NOTE.—The following is a representative list for furnishing a rock garden of moderate size. The plants marked with an asterisk form an ideal selection for a smaller rock garden.

Name	When in Bloom	Colour	Height in Inches	Special Utility
Acæna glauca, A. Novæ Zealandiæ, A. Buchanani (New Zealand Bur)	Summer	Grey, Green and Bronze Foliage	2–6	Carpet or Paving
Acantholimon venustum	July–Aug.	Rosy-pink	4–6	Dry Ledges
Achillea argentea (Milfoil)	June–July	White	6	Moraine or Rock Ledges
Achillea tomentosa	June–Aug.	Yellow	6–9	Rock Ledges
Adonis vernalis .	March–April	Yellow	10	Rock Ledges
Aethionema (Various)	May–July	Purple, Pink, or White	6–12	Moraine
Alyssum montanum (Rock Madwort)	May and June	Yellow and Lemon	3	Carpet or Paving
*Alyssum saxatile compactum	April–May	Golden-yellow	6–10	Crevices, Rock Ledges, Edging
Anchusa myosotidiflora	July–Aug.	Blue	12	Useful for Cutting
Androsace lanuginosa	Summer	Pink	4	Crevices, Moraine
*Androsace carnea (Rock Jasmine)	May–June	Rose and Rose-pink	3	Crevices or under Rock Ledges
Anemone apennina (Windflower), *A. blanda, A. nemorosa, vars., A. pulsatilla, and A. sylvestris	March, April and May	White, Purple, and Sky-blue	6–12	Edging, Carpeting under small Shrubs, Moraine
Anthyllis montana	June–July	Purple	10	Rock Ledges
*Aquilegia glandulosa (Columbine)	May–July	Blue and White	12–18	Useful for Cutting
Arabis (Various) (Rock Cress)	May–July	White, Pale Pink	3–9	Edging, Rock Ledges
Arenaria (Various) (Sandwort)	Summer	White and Purple	2–6	Carpet
*Armeria cæspitosa (Thrift)	June	Lilac-pink	4	Edging or Moraine
Asarum europæum	Spring	Brown	2	Shade under Shrubs
Asperula odorata .	May–June	White	3–4	Slopes or Moraine
*Aster alpinus . .	June and July	White, Blue, Purple, Pink	6	Moraine, Rock Ledges
Aubrietia (Various)	April–June	Purple, Crimson, Rose, and Lilac	4–6	Moraine, Carpet, Edging, Paving, and Walls
Calandrinia umbellata	July–Sept.	Violet-rose	9	Rock Ledges
*Campanula (Various (Bellflower)	May–Sept.	Violet-purple, Blue, White, etc.	3–6	Crevices, Paving (some varieties), Edging, Moraine



The moraine: partly built.



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The moraine: completed.

Name	When in Bloom	Colour	Height in Inches	Special Utility
Cerastium tomentosum	Summer	White	6	Paving or Crevices
Ceratostigma plumbaginoides	July–Sept.	Cobalt-blue	9	Crevices, Ledges, and Walls
Cheiranthus (Various)	April–June	Yellow, Purple, and Bronze	6–12	Crevices, Walls, Edging
Cornus canadensis .	June	White	6	Carpeting under Small Shrubs
Coronilla cappadocica	July–Aug.	Yellow	4–6	Crevices, Ledges, and Walls
*Cyclamen (Hardy Vars.)	Aug. and March–April	Various	3–6	Crevices, Ledges
*Cytisus kewensis .	May–June	Creamy-white	6	Rock Ledges
Cytisus Beani . .	May and June	Yellow	6	Rock Ledges
*Dianthus (Various) (Pinks)	Summer	Rose, White, Purple, and Carmine	2–9	Crevices, Edging, and Moraine (some varieties)
Dicentra formosa .	May	Red	9	Ledges
*Dodecatheon (American Cowslip)	May and June	Rose, Purple, and Lilac	6–12	Moist Beds and Slopes
Draba (Various) .	March–May	Yellow, Pink, or White	3	Crevices, Walls, Paving, Moraine
*Dryas octopetala .	June and July	White	3–6	Carpet and Ledges
*Dryas Sundermannii	July and Aug.	Creamy-white	3–6	Carpet and Ledges
Epimedium alpinum	April–July	Yellow and Crimson	9	Ledges and Rough Places
*Erica carnea (Heath)	Nov.–April	Pink and White	6–12	Edging and Slopes
Erinus alpinus (Vars.)	May–July	Purple, White, and Rose	4	Moraine, Paving, and Walls
Erodium (Various) (Crane's Bill)	May–Sept.	White and Violet, White and Maroon, Blue and Purple, etc.	5–20	Moraine, Ledges, and Walls
Erysimum rupestre	Spring and Early Summer	Yellow	9	Ledges. Useful for Cutting
Euphorbia Myrsinites	Summer	Yellow	6	Ledges
Ferns (Various) .	*See* Separate List of Hardy Ferns in Chapter on Ferns			
Gaultheria nummularioides	Sept.	White and Pink	Creeping	Peaty Ledges
Gaultheria procumbens	July	White and Pink	Creeping	Peat Bed
Genista pilosa . .	May	Yellow	12–24	Edging and Rock Ledges
*Genista sagittalis	May–June	Yellow	3–5	Creeping, Dry Ledges
*Gentiana (Various) (Gentian)	Spring, July and Aug.	Deep Blue, Light Blue, White	2–12	Moraine, Edging, and Ledges

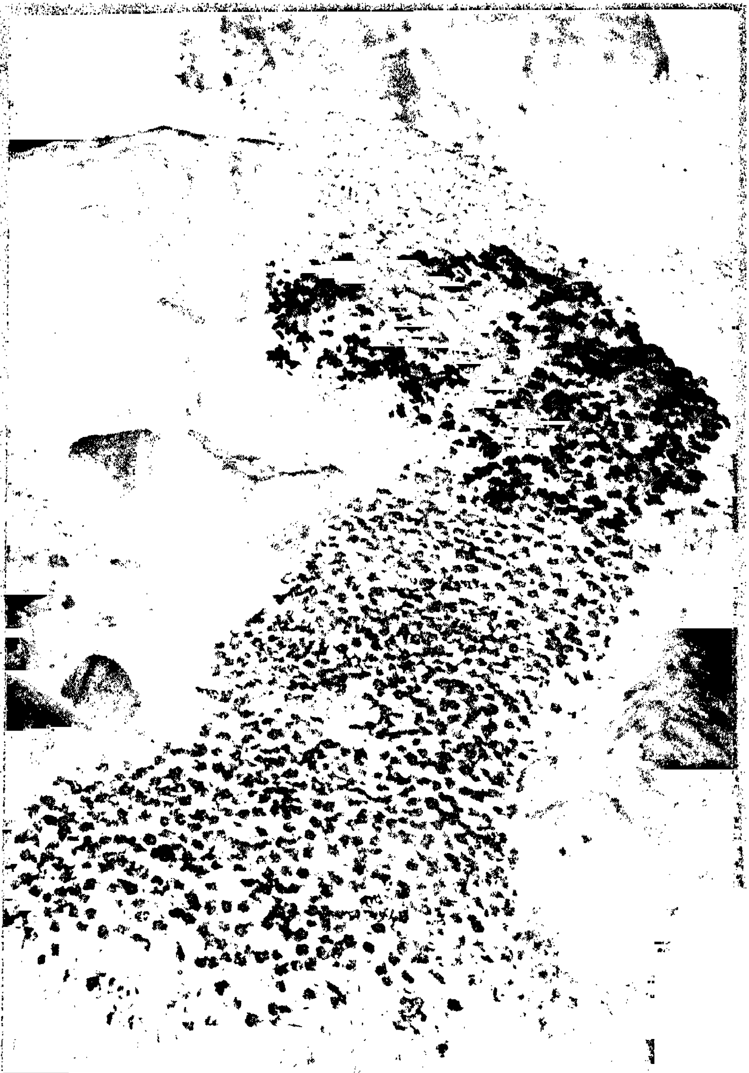
Name	When in Bloom	Colour	Height in Inches	Special Utility
Geranium (Various)	Summer	Pink, White, Flesh, Rose, and Blue	4–9	Moraine, Dry Walls, and Rock Ledges
Geum coccineum .	Summer	Scarlet	14	Rock Ledges
Geum Heldreichii .	Summer	Orange-red	12–15	Moraine, Dry Walls, and Rock Ledges
Geum montanum .	Summer	Yellow	6	Carpet or Edging
Globularia trichosantha	Summer	Blue	8	Edgings or Ledges
*Gypsophila repens	May–Sept.	White and Pink	4–6	Edging or Rock Ledges
*Haberlea rhodopensis	May–July	Lilac	6	Crevices
Helianthemum (Sun Rose)	Spring and Early Summer	Rose-pink, Orange and Rose, Crimson, Yellow		Edging and Rock Ledges
Helichrysum bellidioides	July–Oct.	White, with Silvery Foliage		Ledges with northern exposure, Moraine
Hepatica = Anemone hepatica	Feb.–May	Blue, White, Rose, Red		Useful for Cutting
Heuchera sanguinea (Vars.)	Summer	Red-pink	12–18	Useful for Cutting
Houstonia cœrulea	May and June	Pale Blue	2–4	Shady Ledge
Hypericum (Various) (St. John's Wort)	June–Sept.	Yellow	3–18	Carpet, Edging, Crevices, and Moraine. Shade
Iberis (Candytuft) .	Early Summer	Various	6–12	Edging, Crevices, and Moraine
*Iris, Dwarf Bearded Hybrid Crimean	April and May	Blue and Orange, Violet-purple and Sky-blue	4–9	Rock Ledges
Iris, bulbous . .	Early Spring	ditto	4–12	Rock Ledges
*Jankæa Heldreichi (Syn. Ramondia Heldreichi)	June–July	Pale-blue, Grey Foliage	3–4	Sheltered Ledge
Leontopodium alpinum (Edelweiss)	June–Sept.	Creamy-white	6	Moraine or Crevice
*Lewisia (Various)	June–July	Pink	4–6	Moraine
Linaria alpina (Toadflax)	Summer	Violet	3	Moraine or Carpet
Linum (Various) (Flax)	Summer	Blue-yellow, Sky-blue, or White	4–12	Edging and Rock Ledges
Lithospermum prostratum (Gromwell)	June–Sept.	Gentian-blue	6	Crevices, Carpet, and Edging
*Lotus corniculatus	August	Yellow	6	Rock Ledges
*Lychnis alpina (Campion)	April to June	Rose	6	Crevices
Lysimachia nummularia aurea	Late Summer	Golden-leaved	Creeping	Carpet
Macrotomia echioides (Syn. Arnebia)	Summer	Yellow, with Black Dots	9	Rock Ledges and Walls

Name	When in Bloom	Colour	Height in Inches	Special Utility
Maianthemum bifolium	June	White	5	Carpet
Mazus pumilio . .	June–July	Purple	3	Carpet
*Meconopsis (Various)	Summer	Yellow, Red, White, Blue	9–60	Moist, Shady Ledges
*Mertensia primuloides	June and July	Blue, Yellow Centre	6	Moraine or Crevice
Morisia hypogœa .	April and May	Golden-yellow	2–3	Moraine or Rock Ledges
Myosotis (Forget-me-not)	Spring and Summer	Blue	3–9	Moraine (some varieties)
*Nepeta Mussinii .	May–Oct.	Lavender	12	Edging and Ledges
Nierembergia rivularis (White Cup)	June–Aug.	Creamy-white, Streaked with Purple	3	Carpet or Moist Ledge
Omphalodes verna (Creeping Forget-me-not)	Spring	Deep Blue	4	Carpet and Moraine
Ononis rotundifolia	Summer	Pink	18	Ledges
Onosma taurica .	June–July	Yellow	6	Ledges and Crevices
*Origanum pulchrum	Summer	Pinky-purple	9	Crevices and Ledges
Origanum hybridum	Summer	Rosy-pink	9	Sunny Crevices and Ledges
*Ourisia coccinea .	May–Sept.	Scarlet	9	Moist Beds or Ledges
*Oxalis enneaphylla	May–Sept.	White, with Grey Foliage	6	Ledges
*Oxalis lobata . .	Sept.	Golden	3–4	Sunny Crevice
*Papaver alpinum .	Summer	Various	4–6	Moraine and Rock Ledges
Phlox (Dwarf Alpine)	Spring	Rose, Lavender-blue, White, and Lilac-blue	3–12	Ledges, Carpet, and Edging. Useful for Cutting
Platycodon Mariesii	Summer	Blue	10	Ledges
Polemonium reptans (Jacob's Ladder)	March–June	Blue	12	Ledges
Polygala Chamæbuxus	June–July	Lemon-yellow and Purple	3	Ledges
*Polygonum affine (Syn. Brunonis)	Late Summer	Rose-pink	8	Ledges
*Polygonum vacciniifolium	Late Summer and Autumn	Rose	3	Carpet and Ledges
Potentilla (Various)	Summer	White, Yellow, Orange, and Pink	4–6	Crevices, Carpet, and Moraine
*Primula (Various)	Spring	Various	2–12	Crevices, Edgings, and Moraine
Pulmonaria (Various)	April and May	Blue	6	Ledges and Crevices
*Pyrola rotundifolia	June–July	White	6–8	Shady Ledges
*Ramondia (Pyrenean Primrose)	May–Aug.	Lilac-blue, and White	2–6	Crevices
Ranunculus alpestris (Buttercup)	May–Aug.	White	4	Moraine

Name	When in Bloom	Colour	Height in Inches	Special Utility
Saponaria ocymoides (Soapwort)	Spring and Early Summer	Rosy-pink	6	Crevices and Ledges
*Saxifraga (Various) (Saxifrage)	Jan.–July	Various	2–18	(*See* p. 271)
Scabiosa Pterocephala (Syn. Pterocephalus)	June–Sept.	Pale Violet	4–6	Carpet and Sunny Ledges
*Sedum (Various) (Stonecrop)	July–Oct.	Purple, Pink, Rose, and Yellow	4–15	Carpet, Crevices. Dry Site
*Sempervivum (Various) (Houseleek)	June, July–Sept.	Yellow, White, Pink, and Red	5–10	Sunny, Dry Crevices
Silene (Various) (Catchfly)	June–Sept.	Pink, White, and Reddish	2–18	Carpet, Crevices, and Moraine
*Soldanella alpina (and others)	April and May	Blue	4	Crevices and Moraine
Symphyandra (Various)	July and Aug.	White, Blue, Pale Yellow	6–24	Crevices and Ledges
Thalictrum adiantifolium	June–Sept.	Coloured Foliage	12	Rocky Ledges
Thalictrum alpinum	May–June	Greenish-yellow	4–6	Crevices and Moraine
*Thymus serpyllum var. lanuginosus (Thyme)	June and July	Purple Flowers. Lovely Grey Foliage	3	Carpet, Paving
*Thymus var. coccineus	June and July	Red	3	Carpet, Paving
Veronica (Various) (Speedwell)	June and July	Pink, Blue, and White	1–9	Carpet or Edging
*Viola (Various) (Alpine Pansies)	April to Aug.	Lavender-blue, White, Rose, and Yellow	4–6	Edging and Moraine (some varieties)
Vittadenia triloba .	April–Sept.	White and Pink	3	Edging and Ledges
*Wahlenbergia serpyllifolia	May and June	Violet-blue	3	Moraine
*Wahlenbergia pumilio	June	Lilac-blue with Grey Foliage	3–4	Sunny Crevices and Moraine
Waldsteinia trifolia	March to June	Yellow	6	Ledges and Moraine
Wulfenia carinthiaca	July and Aug.	Blue	9	Ledges
*Zauschneria californica splendens	July–Sept.	Vermilion	12–18	Hot, Sunny Ledges or Crevices

NOTE.—In addition to the flowers named in this list there are many dwarf varieties of annuals, which, though not rock plants in the true sense, deserve a position in the rock garden. They are invaluable for filling empty corners and for hiding the unavoidable bareness in a newly-planted rock garden.

It should not be forgotten that bulbs are a great addition to the rock garden. Almost all the more hardy species are suitable, but those specially adapted are shown in the list of *Bulbs for the Rock Garden* on p. 59. Many ferns are also suitable, *see* Chapter V. For dwarf shrubs for the rock garden *see* list on p. 67.



ROSY MOSSY SAXIFRAGA, ALYSSUM CITRINUM, AND AUBRIETIA

Malby

SOME PLANTS THAT THRIVE ON THE MORAINE

NOTE.—For Fuller Cultural Details, *see* Chapter XII, *Alphabetical List of Plants for the Rock Garden*, p. 143.

Name	Common Name	Colour	Flowering Period	Height in Ins.
Acantholimon venustum	Prickly Thrift	Pink	July–Aug.	6
Aethionema grandiflora	Burnt Candytuft	Rose and White	May–July	6–12
Alyssum montanum and A. saxatile compactum	Rock Madwort	Yellow	April–June	3–10
Androsace lanuginosa	Rock Jasmine	Pink	Summer	4
A. sarmentosa	Rock Jasmine	Rose, White Eye	May–June	4
Armeria caespitosa	Thrift	Pinky-lilac	June	4
Asperula azurea setosa	Woodruff	Light Blue	June–Sept.	4
A. Gussonii	,,	Rose	May–Aug.	4
A. odorata	,,	White	May–June	3–4
A. suberosa	,,	Pink	June and July	3
Aster alpinus	Starwort	Purple, Pink, White, or Blue	June and July	6
Aubrietia (various)	Rock Cress	Purple, Crimson, Rose, and Lilac	April–June	4–6
Campanula alpina	Bellflower	Violet	June–Sept.	4
C. excisa	,,	Blue	June–Sept.	4
C. pulla, etc.	,,	Violet-purple	June–Sept.	3
C. Raineri	,,	Deep Blue	June and July	**2–3**
C. Zoysii	,,	Blue	June–Sept.	2–3
Chrysanthemum alpinum	Ox-eye Daisy	White	June and July	5
Cyanthus lobatus, etc.		Blue	July–Sept.	2–5
Dianthus (*see* Pink)				
Douglasia vitaliana		Yellow	June	3
Draba pyrenaica	Whitlow Grass	Mauve-pink	March–May	3
Dryas octopetala var. lanata	Mountain Avens	White	June–July	3–5
Edelweiss (Leontopodium alpinum)		Creamy-white	June–Sept.	6
Erinus alpinus	Starwort	Purple, White, and Rose	May–July	4
Eritrichium nanum		Pale Blue with Yellow Centre	May	2
Erodium (various)	Heron's Bill	White and Pink	May–Oct.	3–6
Forget-me-not		Purple, Blue	May	3–9
Gentiana bavarica	Gentian	Blue	June	3–4
Gentiana verna (also *var. alba*)		Deep Blue, and White	April–May	3
Geranium (various)	Crane's Bill	White, Pink, Red, etc.	June–Sept.	4–9
Geum montanum	Avens	Yellow	April–Oct.	6
Helichrysum bellidioides	Everlasting Flowers	White	July–Oct.	5
Hypericum Coris	St. John's Wort	Yellow	June–Sept.	3
Iberis saxatilis	Candytuft	White, tinged Red	May	3
Lewisia (various)	Bitter-root	Rosy-pink and White	June	6–8

Name	Common Name	Colour	Flowering Period	Height in Ins.
Linaria alpina	Toad Flax	Violet, blotched Orange	June–Sept.	3–4
Lithospermum Gastonii	Gromwell	Blue	June–July	3
Lychnis alpina	Campion (alpine)	Rose-pink	May and June	4–5
Lychnis Lagascæ		Rose and White	June–July	4
Mertensia primuloides	Lungwort	Blue, Yellow Centre	June and July	6
Morisia hypogœa	Mediterranean Cress	Golden Yellow	April–May	2–3
Omphalodes luciliæ	Rock Forget-me-not	Lilac-blue	June–Sept.	6
Oxalis enneaphylla	Wood Sorrel	White	May–Sept.	6
Papaver alpinum	Poppy	Yellow, Salmon, White, and Orange	May–Sept.	4–6
Papaver triniæfolium		Silver Foliage	—	4–5
Pinks—				
Dianthus alpinus	Pink	Pink or White	June	5
D. Freynii	Pink	Pink	June	3
D. neglectus, etc.	Pink	Reddish-pink	June	3
Potentilla nitida	Cinquefoil	Pale Pink	May–Sept.	4
P. nitida alba	”	White	May–Sept.	4
Primulas (various), *see*	List, p. 257.			
Ranunculus alpestris, etc.		White	May–Aug.	4
Saxifraga—				
The Kabschia Group	“Cushion” or Tufted Saxifrages	White, Yellow, Rose	March–May	2–5
The Porphyrion Group		White, Rose, Purple	March–May	2–10
Silene acaulis	Cushion Pink	Pink	June–Aug.	2
Soldanella pyrolæfolia	Moonwort	Lilac	March	6
Tunica saxifraga		Rose or White	June–Aug.	Trailer
Viola (some vars.)	Alpine Pansies	Various	April–Aug.	4–6
Wahlenbergia Pumilio	Tufted Harebell	Lilac	June–Aug.	3
W. serpyllifolia		Violet-blue	June–Aug.	3

CHAPTER II

THE ALPINE HOUSE

THERE are some choice alpines that cannot be cultivated to the best advantage in the open in our uncertain climate. To say that they are choice does not necessarily mean that they are delicate, but that the blooms of many are apt to be spoilt by inclement weather; it is to these subjects that the Alpine House affords protection while they are in bloom; it will also prolong their season of flowering. Most of the inmates can be brought on during the summer in pans sunk to their rims in ashes in the open, or in sunny frames, until they are about to flower, when they should be transferred to the house, to be removed again to the open after flowering. After the beginning of October all the plants should be housed in a frost-proof frame and must be removed to the cold house as the blooms become visible. While the plants are in the frame ample air must be provided, but frost must be excluded. The choicest *saxifrages*, however, are usually kept in the house the whole year through, as their neat and compact foliage is pleasing and interesting even after the flowers are over, and does not get ragged and untidy.

Culture of Alpines in Pans

The culture of alpines under glass is a comparatively new hobby with the amateur, but one whose popularity is increasing rapidly. The plants, except the bulbs, which should be planted again each autumn, require but little attention and only need re-potting every second or third year; this is best carried out in July or the early part of August. Although the house is as a rule unheated artificially, the plants will furnish a mass of interesting and brilliant bloom, while the neat, and in many cases unusual, foliage of such subjects as the *Shortias, Achilleas, Sedums* and *Saxifrages* will provide unbounded interest in the off season. Great variety of bloom may be had, since a large number of specimens can be kept in quite a small space. The alpine house does not necessarily require artificial heating, although a row of hot-water pipes round the sides is an advantage. In such a case care should be taken to keep them away from the plants, as scorching is instant death to alpines. They are only required during the dark, damp days (especially in cities) of winter.

The alpine house is best of the low span-roof type, so situated that it runs north and south; both sides then get their fair share of the sun. If, as suggested, a span-roof type of house is used, it will be found most convenient to have a centre path and stagings, that will raise the plants up near the glass, down both sides; the plants will then be easily accessible. The stagings should be covered with a two-inch layer of shingle or ashes.

Ventilation

Ample provision must be made for ventilation, for the plants require a fresh, cool atmosphere, and plenty of air, but no cold draughts. Upon the proper ventilation much of the success of the alpine house depends. It is very easy to kill, or at least gravely to injure, a house full of plants by injudicious opening or closing of the ventilators. Only in summer when the temperature is too high, should top and side ventilators be opened simultaneously, and then only in moderation, as a chilly draught between the two openings may cripple the less hardy plants. Only ventilators on the side opposite to that from which the wind is blowing should be opened.

The amount of air admitted depends, of course, on the nature of the plants ; young, growing plants and seedlings require a warm and moist atmosphere, while plants in bloom require the air to be drier. Where there is ample top ventilation there is less need of side ventilation as well ; indeed, many experts now discontinue the use of side ventilators altogether. It is important that the temperature of the house should be watched, especially in the morning —when the sun will often come out suddenly with surprising power, and unless the ventilation is regulated in time, the heat will become intense. In order to avoid the risk of scorching, the ventilators should be opened early in mild weather, beginning with a small aperture, which is gradually increased as the sun becomes more powerful, reversing the process towards evening as the temperature falls. Violent changes of temperature are as harmful to plants as to people. Frost and fog must also be carefully excluded.

Shading

Some means of shading the house should be devised. No definite dates or hours when shading should be commenced can be given, as everything depends upon the weather prevailing. The alpine house, however, usually needs shading from about the end of April, and should be shaded each day as soon as the direct rays of the sun fall on the house. The blinds may be removed as soon as the fiercest rays are passed. Moderate sun will not hurt the great majority of alpines ; it is only the fiercest rays of midsummer that must be warded off. Protection from only the direct rays of the sun should be provided. Where constant attention can be given, an arrangement of roller blinds is, of course, the best, as the amount of light can be better regulated, and the blinds may be left up on dull and sunless days. Where, however, as is often the case, the alpine house must of necessity be left to look after itself for a good part of the day, the simplest, and the most satisfactory, method is to wash the glass over with a mixture of whiting and milk, care being taken to cover all small air bubbles, etc., so common in the cheaper glass, for these act as lenses and intensify the sun's rays. The whiting solution is easily washed off when cloudy weather sets in. Shading is rarely necessary after the end of September.

Compost and Potting

Most alpines thrive in a gritty, well-drained soil. Two-thirds fibrous loam and leaf-mould with one-third coarse, gritty sand makes an excellent compost for most of them. Many of the finer *saxifrages* like a little splintered limestone or some old lime rubble, similar to that used in carnation culture, in their soil. Individual tastes must be studied. (*See* lists, pp. 40–51.) Pot-up in pans from six to nine inches in diameter and about five inches deep; and since ample drainage is required, place two and a half to three inches of broken crocks in the bottom of the pans for plants like the *Androsaces* and the *Saxifrages*. For subjects of a more vigorous nature and for bulbs, one inch of crocks will suffice.

Watering

Alpines require ample water during their growing period and while in bloom; but care must be taken to see that the drainage is adequate, for a stale, stagnant soil is the alpine's greatest enemy. Plants will need most water in the spring and summer. Water at least once a day, sometimes twice, at this season. Dormant plants and those freshly potted are best kept rather dry until growth begins. A watering once a week, or even less frequently, will suffice for most plants in winter time; but the soil must be prevented from becoming dust-dry.

In the summer the watering should be done when the sun's heat is at its lowest, early in the morning or in the early evening, but in spring, late autumn, and in winter it is essential to water in the morning, so that excessive moisture may have drained off before the evening, otherwise there is great liability to "damping-off." The more tender alpines should be stood in a shallow tray with one to two inches of water in the bottom, so that the water may percolate up by way of the drainage without damping the foliage; this is especially necessary in the case of those plants with dense, downy, or waxy foliage which nestles close to the soil. Plants should never be allowed to become so dry as to droop, for this may cause irreparable damage; but if this has occurred, the whole plant, pan, and all, should be stood in water deep enough to cover the pan. When thoroughly soaked, it should not at once be replaced on the staging, but should be put in the shade for an hour or two to recover. Many plants, and especially those that have not recently been repotted, will be the better for a watering with liquid manure every ten days while the buds are forming. This must be discontinued as soon as the flowers are out.

Cleanliness in the House

Cleanliness inside the house is most essential. Aphides, thrips, red spiders, mealy bugs, scale insects, and woodlice are the chief pests met with here. The manner of countering them is shown in the chapter on *Diseases and Pests*, where fumigation and sterilization is described. Keeping every corner of the house and the stem and foliage of every plant as clean and free from rubbish as possible will do a great deal to keep down insect and fungus attacks.

Propagation

The plants are mostly increased by division of the roots, which is best done almost immediately flowering is over. The newly-potted plants should be kept in a close frame, shaded from the sun, until the roots are established; usually in about fourteen days. For treatment of bulbs, *see* Bulbs in Pots, p. 58. *See also* chapter on Propagation, p. 87.

A SELECTION OF SUITABLE PLANTS FOR :

NOTE.—For Fuller Cultural Details, *see* Chapter XII, *Alphabetical List of Plants for the Rock Garden*, p. 143.

Name	Common Name	Colour of Flowers	Time of Flowering	Height in Inches	Diameter of Pot or Pan in Inches
Achillea ageratifolia .	Milfoil or Yarrow	White and Yellow	June–Sept.	6	5–6
Achillea Kellereri .		White	June–Aug.	12	5–6
Adonis amurensis . .	Pheasant's Eye	Yellow	Feb.–April	12	4–5
*Androsace carnea .	Rock Jasmine	Rose and Rose-pink	May–June	3	4–5
*Androsace sarmentosa		Rose, White Eye	May–June	3–4	4–5
*Anemone blanda .	Greek Anemone	Dark Blue, Rose, and White	Feb.–April	6	5–6
*Anemone hepatica .	Hepatica	Red, White, Blue	Feb.	6	5–6
Anemone hortensis .	Anemone	Lilac	Early Summer	9	5–6
Arabis alpina . . .	Rock Cress	White	May–July	6	5–6
*Asperula Gussoni .	—	Rose	Summer	4	4–5
*Campanula alpina .	Bellflower	Light Blue	July–Aug.	4	4
*Campanula pulla .		Violet	June–Sept.	3	4–5
*Campanula pusilla .		Blue	June–Sept.	3	4–5
*Crassula sarcocaulis	Crassula	Red	Summer	6–12	4–5
Cyclamen coum . .	Sowbread	Purple-red or White	Jan. or Feb.	3	4–5

THE ALPINE HOUSE

*All Dwarf Alpines should be grown in shallow pans, not pots.

When to Plant	Best Soil	When to Rest	Time and Method of Propagation	Remarks
April	Light, Dry, rather Poor	Not required	Seed in March; Division in Spring or Autumn	Sunny Position
April	Light, Dry, rather Poor	Not required	Seed in March; Division in Spring or Autumn	Sunny Position
April or Sept.	Rich Deep Loam	Summer	Seeds, March; Division of Roots, Sept.	Sun or Semi-shade
March or April	Loam, Peat with 30% Grit and Limestone Chips	Keep fairly dry during Winter	Seeds, March; Cuttings, Sept.; Division, April	Sun. Do not water overhead during Winter
March or April	Loam, Peat with 30% Grit and Limestone Chips	Keep fairly dry during Winter	Seeds, March; Cuttings, Sept.; Division, April	Sun. Do not water overhead during Winter
Autumn	Rich Sandy Loam	Summer	Seeds, March; Division, March or Sept.	Sun. Winter in Cold Frame, with plenty of Air
October	Rich Sandy Loam	Not required	Seeds, April (open); Division, Sept.–Oct.	Sun. Winter in Cold Frame, with plenty of Air
Sept.–March	Rich Sandy Loam	After Flowering	Seeds, April (open); Division, Sept. or Oct.	Sun. Winter in Cold Frame, with plenty of Air
Sept.	Well-drained Ordinary or Sandy Loam	Not required	Seeds, April (open); Cuttings, August; Root Division, Sept.	Sun. Winter in Cold Frame, with plenty of Air
April or Sept.	Gritty Loam and Leaf-mould	Keep on dry side during Winter	Seed, April (open); Root Division, April	Impatient of Damp. Do not water overhead during Winter
Sept.-Oct.	Loam, Peat, and Leaf-mould (No Lime)	Keep on dry side during Winter	Seeds, March or August; Division, March or Sept.	Winter in Cold Frame
March or Sept.	Loam, Peat, and Leaf-mould (No Lime)	Keep on dry side during Winter	Seeds, March or August; Division, March or Sept.	Winter in Cold Frame
March or Sept.	Cool, Deep Sandy Loam, and Leaf-mould (No Lime)	Keep on dry side during Winter	Seeds, March or August; Division, March or Sept.	Winter in Cold Frame
March	Sandy Loam, with Mortar Rubble	Keep on dry side during Winter	Cuttings, July (on shelf in house); Division, Spring	Water well, but keep Foliage Dry
Aug.	Sandy Loam	Not required	Seed in Spring	Shady Position

Name	Common Name	Colour of Flowers	Time of Flowering	Height in Inches	Diameter of Pot or Pan in Inches
Cyclamen ibericum (Syn. vernum)	Sowbread	Crimson and Rose-purple or Crimson and White	Feb.–April	3	4–5
*Daphne rupestris .	—	Pink	April–May	3–4	4–5
*Dianthus alpinus .	Alpine Pink	Rose	June	5	4–5
*Dianthus neglectus .	—	Rose	June	3	4–5
*Draba aizoon . .	Whitlow Grass	Yellow	March–April	3	4
*Drosera rotundifolia	Sundew	White	June–July	4	4–5
Dryas octopetala . .	Mountain Avens	White	June and July	3	4–5
Erodium chrysanthum	Heron's Bill	Yellow	June–Aug.	5	5–6
Erodium amanum .		White	May–July	6	5–6
Erodium petræum. .		White	June–Aug.	3	4–5
*Gentiana verna . .	Gentian	Deep Blue	April-May	3	4–5
Geranium argenteum .	Crane's Bill	Rose-pink	June–Sept.	4	4–5
Geranium subcaulescens		Rose-purple	June–Sept.	5	4–5
Hepatica triloba (*see* Anemone Hepatica)					
Iberis sempervirens .	Evergreen Candytuft	White	May and June	6–12	4–6

When to Plant	Best Soil	When to Rest	Time and Method of Propagation	Remarks
Aug.	Well-drained, Light, Sandy Loam, Leaf-mould, and Old Mortar Rubble	Not required	Seed sown in gentle heat in Spring	Shady Position
Feb.	2 parts Loam to 1 part of Peat and Sand (With Lime)	Keep on dry side during Winter	Cuttings (Side Shoots), Oct. or Nov.; Layering or Grafting, March or April	Outside June–Sept. Water moderately. Sept.–April inside
Sept.	Gritty Loam (No Lime)	Keep on dry side during Winter	Seed, April; Layering, July	Winter in Cold Frame. Give ample air
Sept.	Gritty Loam (No Lime)	Keep on dry side during Winter	Seeds, April; Cuttings, June; Layering, July	Winter in Cold Frame. Give ample air
April	Well-drained Gritty Loam	Keep on dry side during Winter	Seeds, April; Division, April	Winter in Cold Frame. Give ample air
Sept.	Living Sphagnum Moss, Peat, and Potsherds	Winter	Seeds, any time; Division of Crowns, March	Pots partly under Water, fully exposed to Sun
March or Sept.	Cool Gritty Loam, Limed	Not required	Seed, April; Cuttings, Sept.	Partial Shade
April	Well-drained Sandy Loam	Not required	Seed sown in Spring; Cuttings in July; or Division in April	Sunny Position
April	Well-drained Sandy Loam	Not required	Seed sown in Spring; Cuttings in July; or Division in April	Sunny Position
April	Well-drained Sandy Loam	Not required	Seed sown in Spring; Cuttings in July; or Division in April	Sunny Position
March or Oct.	2 parts Loam to 1 part each Grit and Coarse Sand	Not required	Seed, March (frame); Division, March	Stand in the Open during Summer
March	Well-drained Sandy Loam	Winter	Seed sown in March; Cuttings in frame in August; Division from March to October	Sunny, Open Site
March	Well-drained Sandy Loam	Winter	Seed sown in March; Cuttings in frame in August; Division from March to October	Sunny, Open Site
April or Oct.	Loam, Leaf-mould, and Sand	Not required	Seed, March–May; Division, April or Oct.	Keep in Cold Frame till June. Give Liquid Manure when Buds appear

Name	Common Name	Colour of Flowers	Time of Flowering	Height in Inches	Diameter of Pot or Pan in Inches
Jankæa Heldreichi (Syn. Ramondia)	—	Pale-blue (Grey Foliage)	June–July	3–4	4–6
Lewisia cotyledon	Bitter-wort	Pink, striped with Buff or White	May and June	4	4–5
Lewisia Howellii		Pink, striped with White	May and June	4–6	4–5
Meconopsis aculeata	Himalayan Poppy	Blue	May–June	24	5–6
Meconopsis puniceus		Red	May–June	12–18	5–6
*Mertensia pulchellum	—	Purplish-blue, Yellow Centre	April–May	6	5
*Morisia hypogœa	Mediterranean Cress	Deep Yellow	March–June	2–3	3–4
*Nierembergia rivularis	White Cup	Creamy-white, Streaked Purple	May–Aug.	3	6–7
Œnothera pumila	Evening Primrose	Yellow	July	6	5
*Oxalis adenophylla	Wood Sorrel	Lilac-pink, Dark Eye	May–July	5	4–5
*Phlox subulata	Moss Pink	Rose-pink	April–July	4	5–6
Phyteuma comosum	Horned Rampion	Blue	July	3–6	4–5
*Pinguicula vulgaris	Bog Violet	Purple-Violet	April and May	4	4–5
Primula capitata	Primrose	Violet-blue	April–June	6–12	4–5

When to Plant	Best Soil	When to Rest	Time and Method of Propagation	Remarks
April or Sept.	Fibrous Peat, Loam and Silver-sand	Not required	Leaves, placed in Sand in July and Grown in Heat. Seed, March-April	Shade under North Wall in Summer
April	Sandy Loam and Peat	Keep fairly Dry during Winter	Seeds, March or April (frame); Root Division, March or April	Give a Little Water now and then in Dry Weather
April	Sandy Loam and Peat	Keep fairly Dry during Winter	Seeds, March or April (frame); Root Division, March or April	Give a Little Water now and then in Dry Weather
March	Light, Sandy Loam and Peat	Keep fairly Dry during Winter	Seed, March or April; Division, March	Transplant April, and keep inside till June. Water well while Growing. Dry in Winter
March	Light, Sandy Loam and Peat	Keep fairly Dry in Winter	Seed, March or April; Division, March	Transplant April, and keep inside till June. Water well while Growing. Dry in Winter
April or Sept.	Moist Ordinary with a Little Peat (Gritty)	Keep fairly Dry during Winter	Seeds, March or Sept.; Division, April or Sept.	Shady Position
March or Oct.	Moist, Gritty Loam	Keep fairly Dry during Winter	Seed or Cuttings, March; Division, March or Oct.	Moderate Sun
Spring or Early Autumn	Moist, Sandy Loam and Leaf-mould	Keep fairly Dry during Winter	Seeds, March; Cuttings, August	Sunny Position. Water while Growing. Top-dress with Cow-dung December
April or Oct.	Light, Sandy Loam	Keep fairly Dry during Winter	Seeds, March or April; Cuttings (Young Shoots), Spring or Summer; Division, March or April	Outdoors May–June. Cut back Straggling and Weak Shoots after Flowering
March	Gritty Loam	Keep fairly Dry during Winter	Seeds or Division, March	Sun or Semi-shade
March or Sept.	Sandy Loam and Peat	Keep fairly Dry during Winter	Cuttings, July; Division, March and Sept.	Sunny Position
Nov. to March	Rich Loam, Limestone Grit or Old Mortar, and Leaf-mould	Keep fairly Dry during Winter	Seed, Summer; Division, Spring or Autumn	Transplant Seedlings, April or May
March or April	Moist Rich Peaty Loam and Sphagnum Moss	—	Division, March or April	Shade
Sept.	Well-drained, Moist Loam and Peat	Keep fairly Dry during Winter	Seeds, March or April; Division, April or Sept.	Slight Shade

Name	Common Name	Colour of Flowers	Time of Flowering	Height in Inches	Diamete of Pot or Pan in Inches
Primula denticulata	Primrose	Lilac and White	March	12–18	6–7
Primula Edgeworthii (Syn. Winteri)		Pale Lavender (Grey Foliage)	Feb.	4–5	4–5
Primula farinosa	Bird's Eye Primrose	Rose-purple	May	6	3–4
Primula Forrestii	Primrose	Yellow	May	12–18	5–6
Primula Fortunei		Rose-purple	April-May	4–6	4–5
Primula marginata		Lavender-blue	Feb.–March	6	5–6
Primula rosea		Rose-carmine	March–May	10	4–5
Primula verticillata		Yellow	Spring	12	5–6
Primula viscosa		Rosy-purple	March–May	2–7	4–5
Ramondia pyrenaica	Pyrenean Primrose	Pale Purple-blue, Orange Centre	May to July	3	4–5

When to Plant	Best Soil	When to Rest	Time and Method of Propagation	Remarks
Sept.	Well-drained Moist Loam and Peat	—	Seeds, March or April; Division, April or Sept. (Grow from Seed Annually)	Slight Shade
March or Sept.	Well-drained, Moist Loam and Peat	Keep Foliage Dry in Winter	Seeds, Sept. or March; Division, April or Sept.	Slight Shade under North Wall in Summer
Repot Annually after Flowering	2 parts of Fibrous Loam, to 1 part Leaf-mould, Silver Sand, and Rotted Manure	Autumn and Winter. Keep fairly Dry during Winter	Seeds, March or April; Division, after Flowering	Stand in Cold Frame or under North Wall in Summer
Repot Annually after Flowering	2 parts of Fibrous Loam, to 1 part Leaf-mould, Silver Sand, and Rotted Manure	Autumn and Winter. Keep fairly Dry during Winter	Seeds, March or April; Division, after Flowering	Grow in Cool Greenhouse or Frame. Use Lime in Potting Compost
Repot Annually after Flowering	2 parts of Fibrous Loam, to 1 part Leaf-mould, Silver Sand, and Rotted Manure	Autumn and Winter	Seeds, March or April; Division, after Flowering	Stand in Cold Frame or under North Wall in Summer
Repot Annually after Flowering	2 parts of Fibrous Loam, to 1 part Leaf-mould, Silver Sand, and Rotted Manure	Autumn and Winter	Seeds, March or April; Division, after Flowering	Stand in Cold Frame or under North Wall in Summer
Repot Annually after Flowering	2 parts of Fibrous Loam, to 1 part Leaf-mould, Silver Sand, and Rotted Manure	Autumn and Winter	Seeds, March or April; Division, after Flowering	Stand in Cold Frame or under North Wall in Summer
Repot Annually after Flowering	2 parts of Fibrous Loam, to 1 part Leaf-mould, Silver Sand, and Rotted Manure	Not required	Seeds, March or April; Division, after Flowering	Grow in Cool Greenhouse or Cold Frame
Repot Annually after Flowering	2 parts of Fibrous Loam, to 1 part Leaf-mould, Silver Sand, and Rotted Manure	Autumn and Winter	Seeds, March or April; Division, after Flowering	Grow in Cold Frame or under North Wall during Summer
April	Fibrous Loam and Limestone Chips	Not required	Seed, March; Division, April	Semi-shade

Name	Common Name	Colour of Flowers	Time of Flowering	Height in Inches	Diamete of Pot or Pan in Inche
Rhododendron intricatum	Alpine Rose	Bluish-purple	April–May	6–8	5–6
*Saxifraga apiculata .	Rockfoil	Pale Yellow	March–May	4	4–6
*Saxifraga Boydii .		Pale Yellow	March–May	3	4–6
*Saxifraga Burseriana		White	March–May	4	4–6
*Saxifraga bursiculata		White	March	3	4–6
*Saxifraga diapensioides		White	April–May	3	4–6
*Saxifraga Grisebachii		Crimson	April–May	6	4–
*Saxifraga longifolia .		Creamy-white	May–June	20	4–
*Saxifraga oppositifolia		Crimson-purple	March–April	2	4–
*Saxifraga retrusa .		Rose-carmine	June–July	4	4-
Saxifraga Rocheliana		White or Yellow	March–May	4	4
*Saxifraga Salomonii		White	April	3	4

When to Plant	Best Soil	When to Rest	Time and Method of Propagation	Remarks
Autumn	Turfy Peat and Silver Sand	Not required	Seeds, Cuttings, or Layering in Sept. or March	Grow in Bed of Sandy Peat and Leaf-soil
Spring and Summer	Gritty Loam and Leaf-mould	Not required. Water carefully in Winter	Seeds (Mossy vars.) or Offsets, Spring; Division, April and Summer	Divide, and Plant closely in Pans, with small pieces of Stone in between
Spring and Summer	Gritty Loam and Leaf-mould	Not required. Water carefully in Winter	Seeds (Mossy vars.) or Offsets, Spring; Division, April and Summer	Divide, and Plant closely in Pans, with small pieces of Stone in between
Spring and Summer	Gritty Loam and Leaf-mould	Not required. Water carefully in Winter	Seeds (Mossy vars.) or Offsets, Spring; Division, April and Summer	Divide, and Plant closely in Pans, with small pieces of Stone in between
Spring and Summer	Gritty Loam and Leaf-mould	Not required. Water carefully in Winter	Seeds (Mossy vars.) or Offsets, Spring; Division, April and Summer	Divide, and Plant closely in Pans, with small pieces of Stone in between
Spring and Summer	Gritty Loam and Leaf-mould	Not required. Water carefully in Winter	Seeds (Mossy vars.) or Offsets, Spring; Division, April and Summer	Divide, and Plant closely in Pans, with small pieces of Stone in between
Spring and Summer	Gritty Loam and Leaf-mould	Not required. Water carefully in Winter	Seeds (Mossy vars.) or Offsets, Spring; Division, April and Summer	Divide, and Plant closely in Pans, with small pieces of Stone in between
Spring and Summer	Gritty Loam and Leaf-mould	Not required. Water carefully in Winter	Seeds (Mossy vars.) or Offsets, Spring; Division, April and Summer	Pot singly, adding Lime Rubble
Spring and Summer	Gritty Loam and Leaf-mould	Not required. Water carefully in Winter	Seeds (Mossy vars.) or Offsets, Spring; Division, April and Summer	Divide, and Plant closely in Pans, with small pieces of Stone in between
Spring and Summer	Gritty Loam and Leaf-mould	Not required. Water carefully in Winter	Seeds (Mossy vars.) or Offsets, Spring; Division, April and Summer	Divide, and Plant closely in Pans, with small pieces of Stone in between
Spring and Summer	Gritty Loam and Leaf-mould	Not required. Water carefully in Winter	Seeds (Mossy vars.) or Offsets, Spring; Division, April and Summer	Divide, and Plant closely in Pans, with small pieces of Stone between
Spring and Summer	Gritty Loam and Leaf-mould	Not required. Water carefully in Winter	Seeds (Mossy vars.) or Offsets, Spring; Division, April and Summer	Divide, and Plant closely in Pans, with small pieces of Stone between

Name	Common Name	Colour of Flowers	Time of Flowering	Height in Inches	Diameter of Pot or Pan in Inches
*Saxifraga sancta	Rockfoil	Yellow	April–May	4	4–6
*Saxifraga scardica		White	May	3	4–6
*Saxifraga Stribryni		Purple	May	6	4–6
*Saxifraga thessalica		Red and Yellow	May	6	4–6
*Sedum pulchellum	Stonecrop	Rosy-purple	Summer	Trailing	4–6
*Sempervivum arachnoideum	Cobweb House-leek	Reddish-pink	June–Aug.	5	4–6
*Sempervivum calcareum	—	Pale Red	Summer	6–10	5–6
Shortia uniflora	Crimson Leaf	Pale Pink	May–June	5	5–6
*Shortia giganteum		White	May–June	6	5–6
Silene acaulis	Moss Campion or Cushion Pink	Pink	June–Aug.	2	4–5
*Wahlenbergia serpyllifolia	Thyme-leaved Harebell	Violet-blue	May–June	3	5–6

For bulbs suitable for culture in the Alpine House, *see* list, p. 59. *See also* list of Dwarf Shrubs, p. 67.

*All Dwarf Alpines should be grown in shallow pans, not pots.

When to Plant	Best Soil	When to Rest	Time and Method of Propagation	Remarks
Spring and Summer	Gritty Loam and Leaf-mould	Not required. Water carefully in Winter	Seeds (Mossy vars.) or Offsets, Spring; Division, April and Summer	Divide, and Plant closely in Pans, with small pieces of Stone in between
Spring and Summer	Gritty Loam and Leaf-mould	Not required. Water carefully in Winter	Seeds (Mossy vars.) or Offsets, Spring; Division, April and Summer	Divide, and Plant closely in Pans, with small pieces of Stone in between
Spring and Summer	Gritty Loam and Leaf-mould	Not required. Water carefully in Winter	Seeds (Mossy vars.) or Offsets, Spring; Division, April and Summer	Divide, and Plant closely in Pans, with small pieces of Stone in between
Spring and Summer	Gritty Loam and Leaf-mould	Not required. Water carefully in Winter	Seeds (Mossy vars.) or Offsets, Spring; Division, April and Summer	Divide, and Plant closely in Pans, with small pieces of Stone in between
Spring and Summer	Sandy and Gritty Loam	Not required. Water carefully in Winter	Seeds, March; Division, April	Divide, and Plant closely in Pans, with small pieces of Stone in between
Spring and Summer	Sandy Loam and Lime	Not required. Water carefully in Winter	Seeds, March; Cuttings, Summer; Division, April	Divide, and Plant closely in Pans, with small pieces of Stone in between
Spring and Summer	Sandy Loam and Lime Rubble	Not required. Water carefully in Winter	Seeds, March; Cuttings, Summer; Division, April	Divide, and Plant closely in Pans, with small pieces of Stone in between
April	Two-thirds Sandy Peat and one-third Loam	Not required. Water carefully in Winter	Division, April	Stand out in North Frame during Summer
Autumn	Two-thirds Sandy Peat and one-third Loam	Not required.	Division, April	Keep fairly Moist at all times
April	Moist, Gritty Loam	Not required	Seeds, July or Aug.; Cuttings Summer	Sunny, Open Position
March	Sandy Loam and Peat	Not required	Seed, March; Cuttings, Summer; Division, Spring	Keep on Dry Side during Winter

NOTE.—The plants shown in the list for the Miniature Rock Garden, pp. 53–54, may also be grown in the Alpine House, but to save space have not been repeated in the above list.

THE MINIATURE ROCK GARDEN

Of recent years this type of indoor-gardening has become a source of great interest to amateurs. It consists of a rock garden in miniature constructed on some suitable receptacle, usually a large earthenware pan. This, however, is not essential, in fact, the little plants are much more effective when displayed in an old pig trough or stone sink. These may be picked up at any country sale for a few shillings; but those found in many parts of Westmorland and Yorkshire are particularly beautiful, being hewn out of solid limestone. Sinks are especially adaptable, as they already have the outlet; the troughs would have to be bored to provide for the necessary drainage of the soil.

Construction.—The stone used in the construction of the small rockery usually consists of rugged pieces of limestone or sandstone, although these are not essential. Cork-bark or clinker burrs dipped in cement wash of the right colour make most realistic weather-worn stones, and very often give a much more picturesque effect. A most important point to be considered is suitable drainage, and this may be secured by putting two inches or more of broken crocks, cinders, etc., over the bottom of the trough: the thickness of the layer depending largely upon the depth of the container. Cover this coarse drainage with a sprinkling of finer material to prevent the soil from sifting down and clogging the drainage. Over this spread a layer of half-rotted leaves; these will tend to retain a certain amount of moisture, and will also assist in keeping the soil from mixing with the drainage. Fill the remainder of the trough with soil to within half an inch of the rim, so that when watering the water will not wash the soil over the side. The compost should be of a gritty nature, something on the following lines: one-third part loam, one-sixth part leaf-mould, one-third part quarter-inch chips and sand, and one-sixth part peat. This may be varied to suit the requirements of the plants grown. Two to three inches of soil will provide ample rooting medium for the plants.

On this bed of soil the garden should be built, excavating for valleys and pools and building up with stones to form miniature hills. It will be found much easier to insert the plants as the work goes on, than to plant when the garden has been built. Great care must be taken to pack the soil firmly round the roots of the plants.

Below will be found a list of plants suitable to the Miniature Rock Garden. A few dwarf shrubs should also be included (*see* list, p. 67), the selection made depending, naturally, upon the size of the garden to be planted.

PLANTS FOR THE MINIATURE ROCK GARDEN

NOTE.—For Fuller Cultural Details, *see* Chapter XII, *Alphabetical List of Plants for the Rock Garden, etc.*, p. 143.

Name	Colour	Time of Flowering	Height in Ins.	Best Soil	Remarks
Acantholimon glumaceum	Rosy-pink	July–Aug.	3–5	Gritty, rather Poor Soil	Dry, Sunny Position.
Achillea argentea (Milfoil or Yarrow)	White on Grey Foliage	May–June	3–4	Gritty Loam and Leaf-mould	Dry, Sunny Position. Do not water overhead in Winter
Achillea moschata	Yellow on Grey Foliage	June–July	3–6	Gritty Loam and Leaf-mould	Ditto
Achillea umbellata	White on Silvery Foliage	July	2–4	Gritty Loam and Leaf-mould	Ditto
Aethionema Kotschyi	Pink	May	2–4	¼ Old Lime Rubble; ¾ Loam, Peat, and Sand	Sunny Position. Do not over-water in Winter
Alyssum Lagascæ (Syn. Ptilotrichum purpureum)	Lilac-pink	May and June	2–3	Gritty Loam and Leaf-mould (rather dry)	Sunny Position. Do not over-water
Androsace obtusifolia	Pink	June and July	2–4	Good, Gritty Soil	Sunny Position. Keep fairly Dry
Armeria cæspitosa	Tufts of Pink	May and June	2–4	Good, Gritty Compost	Fairly Sunny Position
Artemisia lanata (Wormwood)	Yellow on Silvery Foliage	Summer	4–6	Gritty Compost	Sunny Position. Do not water overhead
Campanula fragilis (Bell-flower)	Blue	July	3–5	Gritty Loam, Leaf-mould and Sand	Moist, Sunny Position
Campanula cenisia	Blue	June	2–3	Ditto	Moist, Sunny Position

Name	Colour	Time of Flowering	Height in Ins.	Best Soil	Remarks
Campanula Zoysii	Pale Blue	Aug.–Sept.	2–3	½ Chips, ½ Loam and Leaf-mould	Sunny Position. Liable to Damp-off in Winter. Do not water overhead in Winter
Cassiope fastigiata and Mertensiana	White Bells borne on Heath-like Plants	May and June	4–5	½ Peat, ¼ Loam, ¼ Sand (Gritty) (Lime-hater)	Shady Position
Conandron ramondioides	Purple-pink	June	5–6	Peat, Loam, and Sand (Gritty)	Shady Position. Keep fairly Dry in Winter
Cyananthus lobatus	Purple-blue	July and August	5–6 Creeper	Peat, Loam, and Sand (Gritty)	Sunny, Moist Position. Do not water overhead in Winter
Gentiana excisa (Gentian)	Dark Blue	May–Aug.	3–4	¼ Peat, ½ Loam, ¼ Gritty Sand	Shady Position
Gentiana hexaphylla	Pale Blue	August	3–4	¼ Peat, ½ Loam, ¼ Gritty Sand	Fairly Shady. Do not water overhead
Nertera depressa (Coral-moss)	Inconspicuous Flowers. Coral Red Berries	April–Oct.	Carpet	½ Peat, ½ Loam and Sand	Sunny Position with plenty of Moisture at the Roots
Omphalodes luciliæ (Rock Forget-me-not)	Pale Blue on Grey-blue Foliage	Summer	5–6	⅓ Peat, ⅔ Loam, Leaf-mould and Sand	Shady Position where its Foliage may be Dry. Keep fairly Dry in Winter
Paronychia capitata	Silvery-grey Foliage. Small Heads of Glistening Flower Bracts	Summer and Autumn	Creeper	Gritty Loam and Leaf-mould	Sunny and rather Dry Position
Pratia linnæoides	Pinky-white	August	Creeper, 2–4	Gritty Loam and Leaf-mould	Shady, Moist Site
Raoulia australis	Silvery-grey Foliage. Inconspicuous Flowers	A pretty all-the-year-round Carpet Plant	Compact Creeper	Gritty Loam and Leaf-mould	Sunny Position. Keep rather Dry in Winter
Soldanella pusilla	Violet	June–July	3–4	½ Peat, ¼ Loam, and ¼ Sand	Shady Place in Summer
Thymus membranaceus	Pink (large Heads)	May	4–5	Loam, Leaf-mould, Sand	Sunny Position

NOTE.—For bulbs, *see* Bulb List; for shrubs, *see* Shrub List.

CHAPTER III

BULBS FOR THE ROCK GARDEN

SOME of the dwarfer-growing bulbs are among the most attractive and useful subjects for the rock garden. Most of them bloom early and furnish patches of brilliant colour before the great mass of rock plants awake from their winter sleep. So, apart from their own intrinsic beauty, they well deserve their place in the rock garden.

They are very effective if planted in clumps in odd corners of the rock garden, and are especially attractive when naturalized in the grassy slopes adjacent to it. In the rock garden itself they are best planted beneath a carpeting of *Acæna microphylla, Arenaria balearica, Globularia nana,* or some other dwarf trailer. The bulbs will flower before these break into flower, and when their bloom is over, the foliage of the rock plants will hide their decaying leaves.

A list of bulbs especially suitable for planting in the rock garden will be found on p. 59; some are also excellent for growing in the Alpine House, these are shown on p. 59.

The generality of bulbs are of the easiest cultivation, needing but to be planted in the early autumn at about two or three times their own depth, in reasonably good and light garden soil, with which a good amount of leaf-mould has been mixed. They should be planted at a uniform depth and should not come into contact with recent manure. Good drainage is essential. If the soil is in-

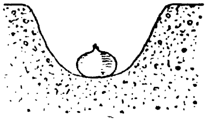


FIG. 3. — CORRECT WAY OF PLANTING A BULB.

The hole for the bulb should be scraped out with a trowel—not made with a dibber.

clined to be at all heavy, it is desirable to lighten it by working in sand at and around each spot in which a clump of bulbs is to be planted, and a layer of sand round each bulb will be found beneficial. Bulbs, as a rule, should be planted deeply, rather than shallowly, especially crocuses, gladioli, and lilies, because the bulbs are then less likely to suffer from the effects of frost.

Plant the bulbs as early in the autumn as possible, especially the spring-flowering ones; they then have ample time to develop their roots before the strain of flowering makes its demands on them. Early planting promotes larger blooms. It is advisable always to plant the bulbs with a trowel and to press them firmly, but gently, into the earth before they are covered up. Never plant bulbs with a dibber; this makes a narrow V-shaped hole in which it is difficult to set the bulb straight and in which an air-space, which will parch the roots, will be left.

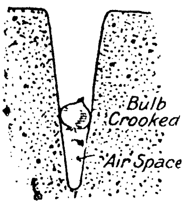


FIG. 4. — INCORRECT WAY OF PLANTING A BULB.

If the bulb is planted with a dibber, the inevitable air-space beneath the bulb will parch the roots.

Most bulbs, having been planted in suitable soil [at a reasonable distance apart, may be allowed to remain for several years without being taken up, divided, and replanted.

Bonemeal is a good artificial manure for bulbs, and should be dusted round them at the rate of 2 oz. to the square yard and thoroughly forked in in February; an equal amount of superphosphate may, with advantage, be added.

Removing Withered Foliage

No attempt should be made to remove leaves or flower-stalks until they have withered and decayed to such an extent that they may be pulled away by a very slight effort. The long sword-like leaves of crocuses, hyacinths, etc., should be neatly plaited together, to obviate untidiness of appearance, and should be allowed to remain until they are quite decayed. The dead flowers ought to be cut off just below the spike of bloom, unless it is wished to save the seed. This holds good for all bulbs that have a woody or strong flower stem.

Most bulbs remain where they are from year's end to year's end, provided that the soil is suitable, the drainage sufficient, and that they are planted deeply. (*See individual cultural details in* List of Plants, Chapter XII.) Bulbs have a tendency to rise to the surface, especially corms, for in the crocus and gladiolus, though not in the cyclamen, the new corms are formed every year on the top of the old ones, which perish.

Naturalizing Bulbs in Grass

Most of our spring bulbs are far more beautiful when viewed in their natural surroundings among the grass and in the meadows, woodlands, or wild garden than when planted, however naturally and artistically, in borders. Most of them, too, especially daffodils, crocuses, and scillas, do much better in this natural state than in beds or borders where they are constantly being disturbed.

Do not plant them on lawns, as the grass cannot be cut until the leaves of the bulbs have turned yellow and dried up. Another word of caution: do not plant daffodils in pastureland, as they are somewhat poisonous to cattle.

The bulbs are best planted in long, narrow, oval strips some thirty to forty feet in length, shaped like patches of snow driven by the wind into long slender drifts on the ground. They should be scattered on the grass over an area shaped as above, so that they lie thicker towards the centre of the " drift," and should be planted with a trowel or bulb planter just where they fall. There should be no regular, well-defined margin to the " drift," the edges should be indistinct and gradually merging into the grass.

August and September is the best planting time; smaller bulbs like the crocus and scilla should be set some three inches apart, while daffodil bulbs should have about ten inches between them. Bulbs that have been used for beds and borders are equally as good as new bulbs for naturalizing in grass and should be replanted immediately after being lifted from the beds and while their foliage is still green.

Some seven years, at least, may be allowed to elapse before it is necessary to disturb naturalized bulbs, provided they receive an annual top-dressing of leaf-mould each autumn.

Bulbs in Pots or Pans

Some of the dwarfer-growing bulbs are among the most charming subjects for the Alpine House. The bulbs should be planted in autumn and the crowns should just appear above the surface of the soil, which should come up to within three quarters of an inch of the top of the pot or pan. After planting, the pots or pans should be well soaked in water and placed in the open on boards or slates so that worms cannot get up into the soil. The pots or pans should be surrounded and covered with a layer of five inches of fibre or ashes, and left for seven to nine weeks until the roots will have formed and the tops have made an inch of growth, when they may be moved to a frame or a cold house, if the roots have made sufficient growth, and should be liberally supplied with water, but not saturated. The less forward plants should be put back in the ashes, and will furnish a succession of later bloom, if brought into the Alpine House at successive intervals. The darkness encourages growth of the roots, which is so essential to good blooms.

The pots or pans should not be subjected to full light until two or three days after the covering of fibre has been removed: that is, until the pale yellow shoots have turned green. When this has happened, the pots or pans should be placed close to the glass and should be brought on gradually till the flower buds are well advanced, when liquid manure-water may be used. A good potting compost consists of a mixture of equal parts of loam, leaf-mould, and well-rotted cow-manure, together with a little sand.

As to the number of bulbs that may be planted in a pot or pan: this, of course, depends on the species of bulb and on the size of pot used. Snowdrops, crocuses, and scillas may be planted so that they practically touch, that is, about nine bulbs in a five-inch pot; larger bulbs, such as daffodils, may be planted six in a five-inch pot; while only three hyacinths should be grown in a six-inch pot.

Some Bulbs and Tubers for the Rock Garden

Allium azureum, A. moly and A. Neapolitanum
Anemone (tuberous)
Bulbocodium vernum
Calochortus Howellii, C. pulchellus, C. venustus
Chionodoxa
Colchicum autumnale and C. montanum
Crocus (various)
Cyclamen coum, C. europæum, C. neapolitanum
Eranthis hyemalis
Fritillaria (various)
Galanthus (Snowdrop)
Iris (various)
Leucojum æstivum and L. vernum
Muscari azureus and M. conicum
Narcissus bulbocodium, N. cyclamineus, N. minimus and N. triandrus
Puschkinia scilloides
Scilla bifolia, S. peruviana, S. sibirica, S. præcox and S. verna

Some Bulbs for the Alpine House

Chionodoxa sardensis
Crocus (various)
Cyclamen coum, C. ibericum, and C. neapolitanum
Fritillaria aurea
Hyacinthus azureus
Iris persica, var. Tauri, and I. histrioides
Muscari botryoides
Narcissus bulbocodium, N. cyclamineus, N. minimus, N. pseudo var. cernuus, and N. triandrus
Scilla bifolia
Tulipa Clusiana, T. montana, T. persica, and T. silvestris

Bulbs and Tubers suitable for Naturalizing in Grass

Allium moly
Anemone apennina
Chionodoxa
Colchicum autumnale and C. montanum (Autumn Crocus)
Crocus (various)
Cyclamen (various)
Fritillaria (various)
Galanthus (Snowdrop)
Leucojum æstivum and L. vernum
Muscari azureus and M. conicum
Narcissus (various)
Ornithogalum
Scilla bifolia, S. sibirica, S. præcox and S. verna

For Individual Cultural Details, Colour, Time of Flowering, and Height, *see* Alphabetical List of Plants, p. 143.

CHAPTER IV

DWARF FLOWERING AND ORNAMENTAL SHRUBS AND TREES FOR THE ROCK GARDEN

DWARF shrubs play a very important part in the composition of the rock garden, but many people neglect them, for they fail to realize the value of a few well-placed specimens. Dwarf shrubs are planted in the rock garden for several reasons; they may be used as a background and to break the skyline; they serve to accentuate the appearance of height or depth: for this purpose they are generally placed on a summit, on a ridge, or in some other prominent position; in exposed situations they may be used to provide shelter; by no means their least useful function is to relieve drabness and monotony in winter.

Happily there are dwarf representatives of almost all species, both evergreen and deciduous; and we have ample choice of colour, form, and flower. Especially adapted to this use are the dwarf conifers, in view of their beauty of form, most noticeable when they stand out almost alone in winter. Another class extremely valuable for the rock garden are the small ericaceous, or heath-like, shrubs. Many are prostrate or of trailing habit and will furnish an immense variety of beautiful colour throughout the year. In spring, summer, and autumn we may choose from a plethora of dwarf flowering shrubs, both evergreen and deciduous.

These dwarf shrubs may be divided into two main classes: those of a prostrate and trailing nature that are used as ordinary rock plants to clothe the rocks, and those of rounded or pyramidal growth that serve, as explained above, to bring variety and contrast to the contours of our rock gardens.

Before planting, the ground should be deeply dug or trenched to a depth of two feet, enriched with well-rotted old manure and leaf-mould, and sufficient space should be allowed to each individual plant for the free and full development of its own peculiar habit of growth. The turf within a radius of three to four feet round bushes planted in grass should be permanently removed so that the earth may be thoroughly broken up and exposed to the air.

Planting

As a general rule, plants of medium size for their kind should be planted rather than fully-grown specimens. They more readily take root and the proportion of losses is much smaller. When there is no hurry and when planting is done with an eye to an effect which is to be produced several years later, it is often wise to plant even younger bushes. In this case it is possible either to fill the space with small bushes and to remove a proportion when they become overcrowded, or each shrub may be allotted the full space it will require in later years, the bare soil in between being temporarily decorated by other plants. Usually the best time to plant deciduous shrubs is from the middle of October, when the leaves begin to fall, to the middle of November, or in February and March. Evergreens are best planted in September and early October, or better still, perhaps, in April and the beginning of May. Never plant evergreens in the depth of winter when their vitality is at the lowest, nor when cold, drying winds are prevalent. Plants that have been grown in pots may, of course, be planted out at almost any time during the year. In the case of both deciduous and evergreen shrubs it is usually wise, at the time of planting, to thin out and reduce the length of the branches by about one-third; this will somewhat relieve the strain put upon the roots, at this time themselves considerably reduced.

The position is prepared by digging out a hole about two feet in diameter, and two feet in depth, in ground that has been well drained. The shrub or tree should be placed upright in the centre of the hole and the lowest roots should be laid out horizontally. Fine earth should then be loosely thrown over them, and pressed down firmly. The next layer of roots, should be treated in a like manner, and so on until the whole of the roots are covered. It is most important that the rootlets should, as far as possible, assume their natural position, thoroughly penetrating and permeating the surrounding soil. It is also most important to make the soil firm at each stage of the planting, in order to minimize the depth to which the shrub will sink. Firm planting is necessary in any soil, and in light land it may be necessary to use a rammer. Shrubs should be planted to about the same depth as in the nursery garden ; this depth can be seen from the marks on the stem.

Grouping and Arrangement

The arrangement of shrubs naturally varies according to the purpose which they are to fulfil. If they are to serve as individual specimens in the rock garden, clearly no " arrangement " is required. If planted in groups to form a background or shelter, it is usually desirable that several plants of a kind should be placed together ; though even here full space should be allowed for each individual plant to develop. This grouping together of, say, three to half a dozen specimens, is not only more effective than scattering single plants about indiscriminately, but it makes it easier to give each group of shrubs the special soil in which they thrive best. (For soils suitable to each species, *see* the Alphabetical List of Plants, p. 143.) The fact that we can have a continued sequence of bloom from flowering shrubs almost all through the year, provided they are carefully selected, is often overlooked. It is necessary, therefore, to select shrubs not only for the colour of their flowers, their suitability for their situation, but also for the time of year at which they flower. Care must be taken that specimens whose colours clash and which bloom simultaneously are not placed together. Associate shrubs whose blooms harmonize in colour and time of flowering, and allow the blooms of the specimens in flower to be set off and enhanced by the foliage of shrubs whose flowers are over or still to come. The stronger-growers must be kept in check by periodical pruning or they may overpower the more beautiful but perhaps less vigorous plants. When planting shrubs as backgrounds, too great a regularity is to be avoided, and care must be taken to see that they do not present a straight, forbidding line. Rather should they afford projections and bays: now running forward into the rock garden, now forming sheltered recesses in which plants may find welcome shade and protection. During the summer the soil round the shrubs should be kept well hoed and should be forked over each winter, except in the case of *Rhododendrons, Azaleas,* etc., these requiring a mulching of well-rotted leaves or peat. Where a shrub is seen to be doing badly or to be exhausted, well-decayed manure should be thoroughly worked into the soil round the roots.

Dwarf Conifers

These are all handsome and graceful trees, and among them will be found many species that may well be planted singly in prominent positions in the rock garden. A list of the best dwarf conifers will be found on p. 68.

Shrubs with Coloured Foliage in Autumn

In planting dwarf trees and shrubs it is well worth while to consider their appearance, not only in the spring and summer, but in the autumn and winter also; for when the garden is at its most sombre, trees and shrubs, if suitably chosen, will provide notes of cheerful and striking colour.

Pruning Shrubs

The time for pruning depends on the season of flowering, and the method of pruning is dependent upon whether the bloom is borne on the new or the old wood. Where the new shoots, that is to say those of the current year, bear the flowers, some of the old and weak growth has to be cut in order that the new shoots may be encouraged. This may be done any time from October to November, as the flowers are usually borne in late spring or early summer. Where, however, the plants flower on the old wood, generally in late winter or early spring, only the decayed and useless old wood must be cut away, which is usually done in late spring or early summer directly after flowering, as it is of vital importance to give the plants as much time as possible to form and ripen new wood before the winter sets in, for on this wood the flowers will be borne the next spring. Many such plants are only pruned sufficiently to keep them tidy and trim.

April is the best time to trim evergreens, except conifers, which are best trimmed in September or October. Conifers, however, save when grown as hedge-plants, are not usually pruned. When such conifers as the cupressus or yew are used as hedges, they can be pruned back to any height desired; the lateral branches also being trimmed in.

The aim of pruning is, firstly, to let air and light to the wood so as to ripen it and thus encourage bloom on flowering shrubs; secondly, to train the plant into the shape and size required; and thirdly, to keep it tidy. There are also several ways of pruning, the most usual being the cutting back of the shoots. Side shoots are often "spurred" or cut right back, leaving only three or four buds; plants requiring this treatment are usually late-flowerers. Again, the strong main shoots may be "topped" or cut back by about one-third to encourage sturdy growth, or may be only just "tipped" to keep the plant tidy and the growth within bounds; at the same time all old and weak wood is cut out.

Another method of pruning, often required, is the removal of the seed-heads from such plants as the rhododendron. If these seed-heads are allowed to remain in position, a poor crop of bloom will result in the following year. Disbudding, the removal of superfluous buds, is also looked upon as pruning, for it increases the size of the flowers left on the plant.

More or less tender shrubs grown in the open in sheltered positions should never be pruned in autumn. This would lay them open to attacks by frost; they should be pruned in April, or even later, when danger of severe frosts is past. The reader is referred to the Alphabetical List of Plants, p. 143, for full instructions for the pruning of each kind.

Propagation of Shrubs

Seeds.—Seeds saved from the garden should not be gathered too early, but must be allowed ample time to ripen, and should be cleaned before being sown. The seeds of most shrubs are best sown under glass, in well-drained boxes of sandy soil, in February or March, and when germinated and sufficiently high, should be thinned out to one and a half to two inches apart; the less hardy kinds being hardened-off in a cold frame and the hardy kinds planted out in nursery beds in the open. The seeds of most shrubs and trees germinate in a month or two; some, however, like the rose and thorn, take a year and even more. The seeds of most conifers must ripen in their cones on the trees for about a year, some require to hang for quite two years. When the cones have been gathered, they are stored in a warm and dry place. The dryness opens the cones and the seeds are liberated, and should be sown thinly in the open in March or April. They should be only just covered with fine sandy soil, seeds from healthy trees only being used. Transplant from the seed-beds to rows in the nursery garden as soon as the seedlings are large enough to handle, usually from one to two years after sowing. It is wise to shelter the young seedlings from the sun and from the frost in winter.

Cuttings.—This is undoubtedly the most popular method of propagating shrubs. It provides larger plants in a much shorter time, and ensures that the new plants shall be true to type, which cannot always be relied upon when raising from seed. This method is resorted to especially when propagating dwarf, variegated, or rare shrubs. Strong, sturdy shoots varying from three to twelve inches in length should be taken. During the spring, summer, and autumn most shrub cuttings may be struck in the open, except the cuttings of most conifers, and many other evergreens which always require the protection and moist atmosphere that glass provides. (*See also* p. 98.) Cuttings inserted in the autumn remain inactive through the winter, and do not usually form roots until the following spring. They must, therefore, not be disturbed until the next autumn, when they may be planted-out twelve to eighteen inches apart in a nursery bed.

Division of Roots.—All the so-called " tufted " shrubs, or those that throw out suckers from their crowns or base, may be propagated by division of roots at the time of year when they are best transplanted.

Grafting or Budding.—If the shrubs are grafted, this is usually carried out under glass between January and early June, but many of them may be grafted in the open in April and May. Budding is usually effected in the open in July and August.

Layering.—This method is usually employed in the spring or early summer.

The reader is advised to consult the Alphabetical List of Plants, Chapter XII, p. 143, where he will find the best methods of propagating each individual shrub, the most suitable time, whether it is effected in the open or under glass, or whether artificial or bottom heat is necessary. Here also will be found full cultural details.

See also Propagation of Plants, Chapter VII, p. 87.

SHRUBS FOR THE ROCK GARDEN

Rounded, Pyramidal, and Erect Growth

Abelia chinensis, etc.
Artemisia abrotanum, etc.
Astragalus Tragacantha
Azalea (some vars.)
*Berberis (various)
Betula alpestris, nana, etc.
*Bryanthus erectus
Cassinia fulvida
Cistus crispus, etc.
*Cornus canadensis, etc.
Corokia cotoneaster
Cydonia Maulei
Cytisus nigricans, etc.
*Daphne alpina, Blagayana, etc.
Deutzia discolor, gracilis, etc.
Fabiana imbricata
Fuchsias (some varieties)
Garrya elliptica
Genista dalmatica, horrida, etc.
Hypericum (various)
Lonicera fragrantissima
Magnolia stellata
Olearia myrsinoides
Ononis fruticosa
Osmanthus Delavayi
Philadelphus microphyllus, etc.
Potentilla dahurica, etc.
Rhododendrons (dwarf vars.)
Rubus australis
Salix herbacea, retusa, etc.
Santolina incana
Senecio laxifolius
Spiræa bullata, etc.
Thuya (dwarf vars.)
†*Viburnum Carlesii, etc.
Yucca angustifolia

Heath-like Lime Haters

Andromeda polifolia
Bruckenthalia spiculifolia
Calluna vulgaris and vars. Alportii, aurea, Foxii, glauca
Cassiope tetragona
Dabœcia polifolia
*Daphne Blagayana
Erica carnea, etc.
Erinacea pungens
†*Gaultheria procumbens, nummularioides, etc.
Hypericum coris, cuneatum, etc.
Kalmia (various)
Ledum latifolium and palustre
Leiophyllum buxifolium
*Pernettya (various)
Polygala Chamæbuxus
Rhododendrons (various)
Spiræa procumbens, etc.
Vaccinium Vitis-idæa
Veronica loganioides
Zenobia speciosa pulverulenta

Trailers and Prostrate Shrubs

†*Cotoneaster adpressa, congesta, humifusa, thymifolia
Cytisus Ardoinii, Beanii, etc.
*Daphne cneorum
Dryas octopetala, etc.
Garrya elliptica
†*Gaultheria procumbens, etc.
Hedera
Helianthemum
Hypericum reptans
†Juniper Sabina, communis nana
Linnæa borealis
Mitraria coccinea
Polygonum vacciniifolium
Salix arbuscula, herbacea, and retusa

Denotes best Berry-bearing Shrubs. † Coloured Foliage in autumn.

MOISTURE-LOVING TREES AND SHRUBS

(Suitable to the Bog or Water Garden)

Name	Common Name	Name	Common Name
Abies nobilis	American Silver Fir	Itea virginica	—
A. pectinata	Silver Fir	Juniperus (various)	Juniper
†Acer rubrum	Red Maple	Leiophyllum prostratum	—
Alnus glutinosa	Cut-leaved Alder	*Leycesteria formosa	Flowering Currant
A. laciniata	Drooping Alder	Mitraria coccinea	—
†*Amelanchier	June Berry	Pieris formosa	—
Andromeda polifolia	Rosemary	Salix alba	Willow
Arundinaria japonica	Bamboo	S. cærulea	
Arundo donax	Great Reed	S. purpurea nana	
Azalea rustica fl. pl.	—	S. babylonica	Weeping Willow
Bambusa (various)	Bamboo	*Sambucus canadensis	—
*Berberis stenophylla	Barberry	Spiræa arguta	Hybrid Spiræa
Betula alba and pendula	Birch	S. japonica, etc.	
Chionanthus retusus	Fringe Tree	S. Lindleyana	
*Cornus alba florida	Dogwood	Tilia Oliveri, etc.	Lime
†*Cotoneaster	Rockspray	†Taxodium distichum	Summer-leafing Cypress
†*Cratægus	Thorns	Thuya japonica	Jap. Arbor-Vitæ
Cupressus (various)	Cypress	T. Orientalis (various)	Chinese Arbor-Vitæ
Deutzia discolor	—	Tsuga Albertiana	Hemlock Spruce
†Enkianthus campanulatus and japonicus	—	Vaccinium corymbosum	Swamp Blueberry
†*Gaultheria procumbens and Shallon	Winter Green	Zenobia speciosa	—
†Hamamelis (various)	Witch Hazel		

Conifers (Dwarf)

Abies balsamea var. Hudsonia, A. pectinata nana, etc.
†Cedrus atlantica aurea, †C. a. fastigiata, C. a. glauca, etc.
C. Deodara var. pendula
C. Libani brevifolia
†Crytomeria japonica nana, †C. j. spiralis, †C. j. Vilmoriniana
Cupressus, Fletcheri
†C. Lawsoniana argentea compacta, minima glauca, etc.
C. obtusa nana
†C. pisifera var. squarrosa
C. thyoides var. ericoides
†C. Sanderæ
Juniperus chinensis prostrata, J. c. aurea, J. c. pfitzeriana, J. communis compressa, J. c. alpina, J. c. alpina aurea
J. Sabina, J. S. procumbens, J. S. prostrata
J. recurva, J. r. pendula, J. r. squamata
Picea excelsa conica, P. e. compacta, P. e. diffusa, P. e. dumosa, P. e. globosa nana
Pinus contorta var. Murrayana, †P. densiflora var. aureo-variegata, P. montana
Taxus baccata ericoides

Note.—* Denotes best Berry-bearing Shrubs. † Coloured Foliage in autumn.

CHAPTER V

HARDY FERNS FOR THE ROCK GARDEN

FERNS can always be distinguished from other plants by two characteristics. Firstly, their young fronds are curled up tightly and gradually unroll as they grow, till the whole leaf is flat and visible. Secondly, they bear, generally on the back of their fronds, lines or masses of very small pods that look like fine brown powder. These pods contain the " spores " from which the young ferns grow. Each genus of fern bears these pods in a different manner: some laterally across the leaf; others longitudinally up the frond; and some in masses. There are, again, numerous species in each genus, all with slightly different traits.

The great variety found among ferns, both as regards size, appearance, and the conditions under which they flourish, makes them one of the most useful of plants to the gardener. They are found all over the world, and vary in size from the tiny moss-like specimens found on walls and in rock crevices to the gigantic tree ferns of the New World.

There used to be an idea that ferns would only do really well in a warm temperature, but this has been found untrue even of many of the exotic kinds. Of course, our own hardy ferns provide a wonderful variety of beautiful kinds, but there are many foreigners which will succeed equally well out of doors in our climate. Ferns may be grown among other plants in the rock garden ; they can be planted in masses in some cool and shaded spot in the marsh garden ; or some place may be devoted to them alone, and most charming fern gardens may be made in parts of the garden where nothing else flourishes, for most of the hardy kinds of ferns will do well with practically no sunlight.

Habits and Requirements

To ensure success with hardy ferns a study must be made of the habits of the plants when growing in their natural home. The British ferns can be seen and observed, but there are many species of hardy ferns which come to us from North America ; others are natives of Japan. These last named are fairly hardy, but will sometimes die during a very hard winter, if no protection is provided. The hardy ferns, as a general rule, like a sheltered and shady position where their roots can get plenty of water. They must have ample air and light, however, or they will become drawn up and weakly. Where they grow naturally, they are accustomed to a certain amount of protection from frost, for this is provided by their own dead fronds, and sometimes by the fallen leaves of trees and bushes growing near them. When grown in the garden, therefore, the dead leaves should not be cut away in autumn, but should be allowed to remain until after the frosts of the following spring. In their natural habitat ferns also receive a good supply of water during the winter months whilst they are dormant. These conditions should, therefore, be imitated as closely as may be in the garden.

The soil in which the ferns grow should not be sodden with water in the winter, but if planted where they do not receive the natural rainfall, they should always be provided with a sufficient supply to keep the roots cool and fresh, and to encourage them to form good strong growths when they begin to sprout in the spring.

Ferns like a good, deep, loamy soil, with ample leaf-mould, peat, and some coarse sand in it, and although kept moist, it should be well drained, for ferns cannot bear a water-logged soil. They are especially intolerant of heavy clay. A compost of two parts of fibrous loam together with one part of leaf-mould, peat, and sand will be found suitable to most ferns. There are just a few which will flourish only in boggy and marshy places, but even these prefer their water supply to be in the form of a running stream or from the occasional overflowing of a pool. Among these water-loving ferns is the well-known and popular *Osmunda regalis,* the Royal Fern, which may be found on warm and sheltered stream-banks and under wet cliffs in the southern counties. The ferns which grow in the cracks of walls and in the crevices among rocks, and therefore apparently exist in dry conditions, do not do so in reality. Their fibrous and spreading roots penetrate the cracks in all directions and find coolness and supplies of water in the hottest weather. Ferns grown on a wall or in the rock garden do the same thing, so that it is not sufficient to give them rocks to creep amongst ; they must also be able to find good soil and an ample supply of moisture under and among them. In planting ferns together, a good deal of care should be expended in their arrangement, and the evergreen and the deciduous kinds should be evenly distributed so that no one particular patch of soil shall be bare and uninteresting throughout the year.

Some Native Species

The *Athyriums* are fine native hardy ferns, deciduous, and therefore only seen in leaf in summer, but well worth growing. The best varieties of the *Athyriums* are : *calotrix, Filix-fœmina* var. *plumosum elegans,* and *Filix-fœmina* var. *pulcherrimum,* commonly known as the Lady Fern (*see* list, p. 76). They are all hardy, but sometimes require a little protection to the young fronds in spring. The Hart's-tongue fern, *Scolopendrium vulgare,* is a very well-known native kind, and looks very beautiful lining a hollow bank or ditch with its long, shining, strap-shaped fronds. It has a great many varieties, all of which are evergreen and succeed best under cultivation on steep banks in the shade, and in a light, loamy soil of a calcareous nature. A native kind, *S. v. crispum*, is a pretty variety, with broad, undulating fronds with a crinkled and fringed edge. Some of these ferns, such as *S. v. Kelwayii*, form little bulbils on the margins of the fronds, which may be carefully removed and treated as seedlings, when they will soon make strong young plants. They like a sheltered site in moist, sandy loam and leaf-mould to which has been added a little mortar-rubble.

The Hard Fern *Lomaria Spicant* is another good British hardy fern, being evergreen with pinnate or divided fronds. It enjoys shade, and grows naturally in deep hollows and dells where the soil consists chiefly of leaf-mould and dead leaves, with a good loam beneath. The polypody, *Polypodium*, is well known in its wild state, many of its numerous varieties growing freely on old tree stumps and roots. Of its varieties, *P. cambricum* is one of the prettiest and at the same time one of the oldest. These ferns do well in rock gardens, liking fibrous loam, peat, leaf-mould, and a little sand as a mixture in which to grow. They may be propagated by division, and this is the best way if it is required to keep the strain true to its characteristics. It is evergreen and, unlike many ferns, bears sunlight well. It does not prefer it, however, and flourishes best in, at least, partial shade.

The Oak Fern is related to the foregoing, being really *P. Dryopteris*. It is a very pretty fern, of a beautiful pale green colour, and is deciduous. It likes a very sheltered position, where its pretty three-partate fronds flourish well. The Beech Fern, another of the same family, *P. Phegopteris*, is like the Oak Fern, but differs slightly from it in the arrangement of its fronds. It likes plenty of moisture when dormant, otherwise its treatment is the same as that of the Oak Fern.

The Shield Fern, *Aspidium*, has several varieties, of which the Soft-shield fern, *A. angulare*, is the best for general use. These ferns are evergreen and many of the varieties in cultivation are crested and plumose. They like a sheltered position, but do fairly well anywhere, their chief demand being for a rich loamy, well-manured soil. *A. aculeatum* is much like *A. angulare*, except that it has a more shining surface. Its habits are quite similar.

Another aspidium—*A. lonchitis*—is known as the Holly Fern, and grows in high places. It is, as its name implies, a prickly fern, and is of a rather delicate nature, calling for care in the matter of watering. If it is allowed to get too moist when dormant, or if it is planted in too warm a spot, the plant is likely to die.

The *Nephrodium Filix-mas*, the Male Fern, and *N. pseudo-mas* are both good species. The first is, perhaps, the best known of all British ferns, and does very well in town conditions, growing in great clumps and masses in smoky suburban gardens. It is deciduous, but owing to its habit of keeping its fronds very late in the autumn and shooting out very early in the spring, it is very nearly as useful as some of the evergreens. It will grow practically everywhere, shade suiting it, perhaps, better than full sunlight, but it is quite happy in partial sun. When planting these ferns they should be put in deeply, the crown being only just above the surface of the ground. *N. pseudo-mas* is an evergreen, with a few pretty crested forms.

Pteris aquilina is the common Bracken, too well known to need any description. It likes a peaty, sandy soil, and is best raised from seed, or more correctly "spores," for the old roots, or rhizomes, are apt to do badly when replanted. The Bladder Fern is a pretty deciduous fern, doing well in many places where most plants would fail, though it is not good for culture in pots.

Imported Ferns

Among the hardy ferns introduced from North America the best for garden culture is, perhaps, *Adiantum pedatum.* This is a deciduous fern, and makes fine big clumps, if well grown. When the clump is in good condition and strong when planted, fronds as much as two feet high are often produced in the first season, increasing in size as the plant becomes established. It resembles *Nephrodium Filix-mas* in keeping its fronds very late and renewing them very early. *Aspidium acrostichoides* and *A. grandiceps* are both good imported rockery ferns, and there are many others which do well. Most of these ferns like protection from the early morning sun, and should be looked to and perhaps protected during the late spring frosts. All hardy ferns do best in a situation in which they get the direct sunlight, if at all, only in the late afternoon.

The Propagation of Ferns

Propagation by Spores.—Ferns may be increased by several methods. The most usual method is by means of " spores " which are contained in small pods, generally found on the underside of the fronds. When these pods are ripe, that is just beginning to burst, the fronds should be picked and wrapped in smooth white paper. If these are undone after a day or so, the paper will be found to be covered with fine brown dust, which looks like brown pollen and is composed of millions of tiny " spores." Put some two inches of drainage crocks into the bottom of a clean pot, fill it up to within an inch of the top with a compost of equal parts of loam, peat, leaf-mould, and sand that has been passed through a quarter-inch sieve. Then press this down firmly, pour boiling water over it to sterilize the soil, and, when cool, scatter the spores very thinly over the surface. Now cover the pot with a sheet of glass and some brown paper, and stand it in a shady, moist corner. In about two weeks' time a green film will be seen to have grown over the surface of the soil; later this will assume the appearance of green scales, which after a little time will put forth tiny fronds that must be pricked off and be potted up singly when large enough. The spores are sown in the same way as seeds (*see* Sowing Seed in the chapter on Propagation, p. 88), but the compost used must first be sterilized with boiling water and then allowed to cool thoroughly. Ferns may be propagated by spores at any time of the year, but preferably in March or July.

Propagation by Division.—This operation is best carried out in spring, that is to say, in March or April, at which time the ferns are planted out. (*See* Division of Roots, p. 102.) The roots should be cut apart with a sharp knife, and the small plants can then be planted out in the positions they are to occupy permanently.

Propagation by Trailing Roots.—This is the simplest of all the methods and is appropriate to such ferns as the *Polypody.* It consists in cutting off an inch or so of the tuberous root and potting it up. The root must, of course, have a frond sprouting from it.

Propagation by Minute Plants on the Fronds.—On Shield Ferns and some others small replicas of the parent plant appear from time to time on the fronds. If it is desired to increase the ferns, the frond bearing these little plants should be cut off and pegged down on to light, sandy, well-sieved, and smooth soil. The little plants will soon root, and as soon as this is accomplished they can be cut apart and potted-up. A close, moist atmosphere will encourage the rooting.

The following list, although of necessity far from complete, gives an adequate selection of beautiful genera, species, and varieties. Do not, therefore, as is so often the case, fill the fern garden with common species and neglect the more interesting, but equally hardy kinds. Remember, too, in planting, that the smaller-growing kinds must not be overcrowded by those of more vigorous growth.

SOME HARDY FERNS

NOTE.—For Fuller Cultural Details *see* Chapter XII, *Alphabetical List*

Name	Common Name	Evergreen or Deciduous	Height in Inches	Sun or Shade
Adiantum pedatum . .	Hardy Maidenhair	Deciduous	10–30	Shade
Aspidium acrostichoides .	Christmas Fern	Deciduous	18	Shade
Aspidium aculeatum and var. pulcherrimum	Hard Shield Fern	Evergreen	30	Sun
Aspidium angulare cristatum	Soft Prickly Shield Fern	Evergreen	30	Shade
Aspidium angulare plumosum	Soft Prickly Shield Fern	Evergreen	20–30	Shade
Aspidium lonchitis . .	Holly Fern	Evergreen	10	Sun or Partial Shade
Aspidium munitum . .	—	Evergreen	10–25	Shade
Asplenium adiantum-nigrum	Black Maidenhair Spleenwort	Evergreen	6–12	Shade
Asplenium fontanum . .	Smooth Rock Spleenwort	Evergreen	5	Shade
Asplenium officinarum .	Spleenwort	Evergreen	5	Shade
Asplenium ruta-muraria .	Wall Rue	Evergreen	2	Shade
Asplenium septentrionale	Forked Spleenwort	Evergreen	4	Shade
Asplenium Trichomanes .	Maidenhair Spleenwort	Evergreen	4–10	Shade
Asplenium viride . . .	Green Spleenwort	Evergreen	4–6	Shade
Athyrium var. calotrix .	Lady Fern	Deciduous	20–50	Shade
Athyrium Filix-fæmina var. cristatum	Lady Fern	Deciduous	20–50	Shade
Athyrium Filix-fæmina var. depauperatum	Lady Fern	Deciduous	20–50	Shade
Athyrium Filix-fæmina var. multifurcatum	Lady Fern	Deciduous	20–50	Shade
Athyrium Filix-fæmina var. plumosum elegans	Lady Fern	Deciduous	20–50	Shade

SOME HARDY FERNS

of Plants for the Rock, Wall, Paved, and Marsh Gardens, p. 143.

Position	Best Soil	When to Plant	Method and Time of Propagation
Sheltered Spot in Rock Garden	Cool Loam and Leaf-mould	April	Spores, July (glass); Division, April
Rock Garden	Peat and Loam in Equal Proportions	April	Spores, July (glass)
Cool, Sheltered Spot in Rock Garden	Rich, Sandy Loam, Peat, and Leaf mould	March	Spores, July (glass)
Sheltered Spot in Rock Garden	Rich, Sandy Loam, Leaf-mould, and Peat	April	Spores, July (glass)
Sheltered Spot in Rock Garden	Rich, Sandy Loam, Peat, and Leaf-mould	April	Spores, July (glass)
High and Dry Slopes	Rich, Sandy Loam, Peat, and Leaf-mould	April	Spores, July (glass)
Rock Garden	Peat and Loam in Equal Proportions	April	Spores, July (glass)
Sheltered Spot in Rock Garden or on Wall	Peaty Loam, Leaf-mould, and Mortar Rubble	April	Division, April; Spores, July (glass)
Sheltered Spot in Rock Garden or on Wall	Peaty Loam, Leaf-mould, and Mortar Rubble	April	Division, April; Spores, July (glass)
Rock Garden or Wall Crevices	Dry, Sandy Loam, Leaf-mould, and Mortar Rubble	April	Division, April; Spores, July (glass)
Rock Garden or Wall Crevices	Peaty Loam, Leaf-mould, and Mortar Rubble	April	Division, April; Spores, July (glass)
Rock Garden or Wall	Peaty Loam, Leaf-mould, and Mortar Rubble	April	Division, April; Spores, July (glass)
Sheltered Spot in Rock Garden or Wall	Peaty Loam, Leaf-mould, and Mortar Rubble	April	Division, April; Spores, July (glass)
Sheltered Spot in Rock Garden or Wall	Peaty Loam, Leaf-mould, and Mortar Rubble	April	Division, April; Spores, July (glass)
Rock Garden or Wild Garden	Peat, Sandy Loam, and Leaf-mould	April	Spores, July (glass)
Rock Garden or Wild Garden	Peat, Sandy Loam, and Leaf-mould	April	Spores, July (glass)
Rock Garden or Wild Garden	Peat, Sandy Loam, and Leaf-mould	April	Spores, July (glass)
Rock Garden or Wild Garden	Peat, Sandy Loam, and Leaf-mould	April	Spores, July (glass)
Rock Garden or Wild Garden	Peat, Sandy Loam, and Leaf-mould	April	Spores, July (glass)

Name	Common Name	Evergreen or Deciduous	Height in Inches	Sun or Shade
Athyrium Filix-fæmina var. pulcherrimum	Lady Fern	Deciduous	20–50	Shade
Blechnum (syn. Lomaria) spicant imbricatum	Hard Fern	Evergreen	10	Shade
Cryptogramme (syn. Allosorus) crispa	Mountain Parsley Fern	Evergreen	4–6	Partial Shade or Sun
Cystopteris alpina . .	Alpine Bladder Fern	Deciduous	4–8	Shade
Cystopteris bulbifera . .	Mountain Bladder Fern	Deciduous	6–12	Shade
Cystopteris fragilis .	Brittle Mountain Bladder Fern	Deciduous	4–8	Shade
Cystopteris montana . .	Mountain Bladder Fern	Deciduous	6–8	Shade
Lastrea. *See* Nephrodium				
Lomaria alpina . . .	Alpine Hard Fern	Evergreen	4–8	Shade
Nephrodium æmulum .	Hay-scented Fern	Evergreen	10–20	Partial Shade
Nephrodium dilatatum var. grandiceps	Broad Buckler Fern	Evergreen	25	Partial Sun
Nephrodium dilatatum var. lepidotum	Broad Buckler Fern	Evergreen	25	Partial Sun
Nephrodium Filix-mas var. cristatum	Common Male Fern	Deciduous	25–50	Sun or Shade
Nephrodium Goldieanum	Broad Buckler Fern	Almost Evergreen	25–35	Partial Sun
Nephrodium montanum	Mountain Buckler Fern	Almost Evergreen	10–20	Partial Sun
Nephrodium montanum var. cristatum gracile	Mountain Buckler Fern	Almost Evergreen	10–20	Partial Sun
Nephrodium montanum var. ramo-coronans	Mountain Buckler Fern	Evergreen	10–20	Partial Sun
Nephrodium pseudo-mas var. cristatum	Male Fern	Almost Evergreen	25–50	Partial Sun
Nephrodium remotum .	Remote Buckler Fern	Deciduous	15	Partial Sun
Nephrodium rigidum . .	Rigid Buckler Fern	Deciduous	15	Partial Sun
Nephrodium spinulosum .	Prickly Buckler Fern	Almost Evergreen	10–18	Partial Sun
Nephrodium Thelypteris	Marsh Buckler Fern	Almost Evergreen	15–25	Partial Sun
Onoclea sensibilis . . .	Sensitive Fern . .	Deciduous	10–15	Partial Sun

Position	Best Soil	When to Plant	Method and Time of Propagation
Rock Garden	Peat, Sandy Loam, and Leaf-mould	April	Spores, July (glass)
Rock Garden or in Deep Hollows and Dells	Sandy Loam and Leaf-mould. (No Lime)	April	Spores, July (glass)
Moist Spot in Rock Garden	Dry, Sandy Loam, Peat, and Leaf-mould	April	Division, April
Moist Crevices in Rock Garden	Dry, Sandy Loam, Peat, and Leaf-mould	April	Division, April
Crevices in Rock Garden	Dry, Sandy Loam, Leaf-mould, and Mortar Rubble	April	Division, March ; Spores, July (glass)
Crevices in Rock Garden	Dry, Sandy Loam, Leaf-mould, and Mortar Rubble	April	Division, March ; Spores, July (glass)
Crevices in Rock Garden	Dry, Sandy Loam, Leaf-mould, and Mortar Rubble	April	Division, March ; Spores, July (glass)
Warm, Sheltered Spot in Rock Garden	Sandy Peat, Loam, and Limestone	April	Division, April; Spores, July (glass)
Wild Garden	Loam, Leaf-mould, and Sand	March	Spores, July (glass)
Rock Garden	Sandy Loam and Leaf-mould	March	Spores, July (glass)
Rock Garden	Sandy Loam and Leaf-mould	March	Spores, July (glass)
Excellent for the Town Garden	Sandy Loam and Leaf-mould	March	Spores, July (glass)
Rock Garden	Sandy Loam and Leaf-mould	March	Spores, July (glass)
Rock or Wild Garden	Good Loam, Leaf-mould, and Sand	March	Spores, July (glass)
Rock Garden or Wild Garden	Moist Loam	March	Spores, July (glass)
Rock Garden	Moist Loam	March	Spores (July) glass
Rock Garden	Sandy Loam and Leaf-mould	March	Spores, July (glass)
Rock Garden	Sandy Loam and Leaf-mould	March	Spores, July (glass)
Rock Garden	Sandy Loam, Leaf-mould, and Mortar Rubble	March	Spores, July (glass)
Rock Garden	Sandy Loam and Leaf-mould	March	Spores, July (glass)
Bog Garden	Loam, Peat, and Sand	March	Spores, July (glass)
Cool, Moist Spot in Rock or Bog Garden	Sandy Loam and Leaf-mould	April	Division, April; Spores, July (glass)

Name	Common Name	Evergreen or Deciduous	Height in Inches	Sun or Shade
Osmunda cinnamonea .	—	Deciduous	25–36	Partial Shade
Osmunda Claytoniana .	—	Deciduous	12–25	Partial Shade
Osmunda regalis . . .	Royal Fern	Deciduous	10–100	Partial Shade or Sun
Osmunda regalis cristata	Tasselled Royal Fern	Deciduous	25–60	Partial Shade
Osmunda regalis var. palustris	Royal Fern	Deciduous	30	Partial Shade
Polypodium calcareum .	Limestone Polypody	Evergreen	10	Shade
Polypodium Dryopteris .	Oak Fern	Deciduous	6–8	Partial Shade
Polypodium Phegopteris .	Beech Fern	Deciduous	6–9	Partial Shade
Polypodium vulgare . .	Common Polypody	Evergreen	12	Shade
Polypodium vulgare cambricum	Welsh Polypody	Evergreen	10	Shade
Polypodium vulgare var. cornubiense	Cornish Polypody	Evergreen	10	Shade
Polypodium vulgare var. semilacerum	Irish Polypody	Evergreen	10	Shade
Polystichum. *See* Aspidium.				
Pteris aquilina . . .	Bracken	Deciduous	40	Shade
Scolopendrium vulgare .	Hart's Tongue	Evergreen	10	Shade
Scolopendrium vulgare var. crispum	Frilled Hart's Tongue	Evergreen	10	Shade
Scolopendrium vulgare Kelwayii	Tasselled Hart's Tongue	Evergreen	10	Shade
Woodsia hyperborea . .	Woodsia	Deciduous	3–6	Shade
Woodsia ilvensis . . .	Woodsia	Deciduous	3–6	Shade

NOTE.—Although most ferns can be raised from spores, the numerous varieti
therefore, be i

Position	Best Soil	When to Plant	Method and Time of Propagation
Bog Garden or Stream Sides	Moist, Peaty Loam, Leaf-mould, and Sand	March	Offsets, March; Spores, July (glass)
Bog Garden or Stream Sides	Moist, Peaty Loam, Leaf-mould, and Sand	March	Offsets, March; Spores, July (glass)
Warm and Sheltered Spot in Bog Garden or on Stream Sides	Moist, Peaty Loam, Leaf-mould, and Sand	March	Offsets, March; Spores, July (glass)
Warm Sheltered Spot in Bog Garden or on Stream Sides	Moist, Peaty Loam, Leaf-mould, and Sand	March	Offsets, March; Spores, July (glass)
Bog Garden or Stream Sides	Moist, Peaty Loam, Leaf-mould, and Sand	March	Offsets, March; Spores, July (glass)
Wall, Rock Garden, or Bank	Sandy, Fibrous Loam, and Leaf-mould	April	Division, April; Spores, July (glass)
Sheltered Wall or Rock Garden	Dry, Sandy, Fibrous Loam, Leaf-mould, and a Little Sandstone	April	Division, April; Spores July (glass)
Sheltered. Must be kept Moist while Dormant	Dry, Sandy, Fibrous Loam, Leaf-mould, and a Little Sandstone	April	Division, April; Spores, July (glass)
Wall, Rock Garden, or Bank	Sandy, Fibrous Loam and Leaf-mould	April	Division, April; Spores, July (glass)
Wall, Rock Garden, or Bank	Sandy, Fibrous Loam and Leaf-mould	April	Division, April; Spores, July (glass)
Wall or Rock Garden	Ordinary	April	Division, April; Spores, July (glass)
Wall or Rock Garden	Ordinary	April	Division, April; Spores, July (glass)
Woodland	Sandy Loam and Peat	October (Seedlings)	Spores, July (glass)
Sheltered Spot in Rock Garden or Moist Bank	Moist, Sandy Loam, Peat, Leaf-mould, and Mortar Rubble	April	Division, April; Spores, July (glass)
Sheltered Spot in Rock Garden or Moist Bank	Moist, Sandy Loam, Peat, Leaf-mould, and Mortar Rubble	April	Division, April; Spores, July (glass)
Sheltered Spot in Rock Garden or Moist Bank	Moist, Sandy Loam, Peat, Leaf-mould, and Mortar Rubble	April	Division, April; Spores, July (glass)
Sheltered Spot in Rock Garden or Moist Bank	Dry, Sandy Loam, Leaf-mould, and a little Peat, if possible	April	Division, April; Spores, July (glass)
Sheltered Spot in Rock Garden or Moist Bank	Dry, Sandy Loam, Leaf-mould, and a little Peat	April	Division, April; Spores, July (glass)

of some of the species are not likely to come true when so raised, and should,
creased by division.

CHAPTER VI

ORNAMENTAL GRASSES FOR THE ROCK OR MARSH GARDEN

IT is scarcely possible to overestimate the decorative qualities of ornamental grasses, both as marsh plants and for providing variety in the rock garden. Some are exceedingly graceful, others remarkably neat and compact in growth; there are some, again, very curious in form; while others are stately and majestic in appearance. The graceful and curious are best suited for planting in the wild garden, while the neat, compact-growing kinds make beautiful subjects for the rock garden.

By the side of streams and ponds the larger-growing species make handsome specimens.

In spite of the utility, and the ease with which most of them may be grown, ornamental grasses are not used in gardens to anything like the extent that they should be. This may be because the gardener is ignorant of the beautiful varieties available. All the species may be gathered and dried for winter decoration.

Tall-growing Grasses

First, let us consider those splendid importations from the River Plate, *Cortaderia argentea, C. a. elegans,* and *C. conspicua* (syn. *Arundo conspicua*), the Pampas-grass. In severe winters these should have some dry, strawy litter thrown over them, and a few spruce boughs or evergreen shrubs stuck round to prevent the litter blowing away. The pampas-grass resists the cold of our ordinary seasons, but in many instances succumbs to the severity of an unusually cold and wet winter. Old plants seem hardier than young ones, arising probably from the larger top affording a more efficient protection to the roots. The old leaves should not be removed until the end of April, as they give the best possible protection as far as it goes; experience, however, shows that of themselves they will not always provide sufficient protection in our climate: hence the necessity of a little extra litter.

This is decidedly the king of all the grasses, and deserves a place in every garden. As the centre group of a *grassery*, or placed in a shady dell, near rocks or water, it finds a congenial home. A rich alluvial soil, at least a yard deep, abundance of space to unfold its large, graceful leaves and throw up its flower-stems, an unlimited supply of water, and shelter from strong winds, are all the conditions its successful culture demands. It can be raised from seed, and with liberal treatment, seedlings will flower in their third or fourth year. By sowing thinly in February or March in pots, and planting out in prepared beds in May, almost a season may be gained in the growth of the plants.

Like all the grasses, the seed should be barely covered with soil, and the surface kept moist, until germination is assured. There are, however, several varieties of this grass, in addition to its sexual distinctions. When practicable it is, therefore, best to purchase plants divided from those that have grown the finest flower-stems; the pampas-grass can be rapidly increased by division. Plants thus divided are more tender than others, and will require more protection until they are thoroughly established. Few plants, however, are more worthy of attention, as they have a fine appearance when growing; and if the flower-stem is cut before it begins to fade, it is almost as showy when dried. In addition to the localities here pointed out for them, they also contrast admirably with large masses of yews or other dark-foliaged shrubs.

A companion grass to this, with broad-striped foliage and large, feathery flowers, is the *Erianthus Ravennæ*, the Woolly Beard Grass, growing to four or more feet in height. Other tall-growing grasses are: *Arundo donax* and *A. conspicua* syn. (*Cortaderia conspicua*), which much resemble the Pampas-grass; and a beautiful, little-known kind, *Glyceria aquatica variegata.*

The Tussock Grass and some of the common reeds and rushes also form beautiful features when used in connection with these.

Annual Grasses

Among the annual grasses we have eight or ten varieties of the *Holcus saccharatus*, or Sugar-cane, whose elegant leaves, stately stems, and variously-coloured heads of corn are highly ornamental. These are half-hardy annuals, and should be sown in gentle heat, being pushed rapidly forward so as to secure strong plants for planting out in May. The variegated, white-striped, and beautifully marbled *Zea*, or maize, requires similar treatment, and has a most pleasing effect when planted among other subjects. The pretty Millet Grass, *Milium effusum*, charming Love Grasses (*Eragrostis amabilis capillaris, E. elegans, E. multiflora* syn. *megastachya, E. papposa*, and *E. Ægyptiaca*), and the several varieties of *Briza*, or Quaking Grass, especially *Briza geniculata* and *B. minor* var. *gracilis*, should be sown either in pots or in a rather sheltered site out of doors.

Other beautiful annual grasses are *Agrostis laxiflora, A. pulchella, Desmazeria sicula* (syn. *Brizopyrum siculum*), whose branches rival in beauty the deciduous cypress, *Bromus brizæformis, B. lanuginosus*, and *Lagurus ovatus*, the Hare's Tail Grass. *Stipa arundinacea* and *Panicum Teneriffae* (syn. *Tricholæna rosea*) are also useful, and, like all other annual grasses, should be raised from seed sown in spring.

Perennials and Biennials

The various *Eulalias*, the two Feather Grasses, *Stipa pennata* and *S. gigantea*, hardy perennials, and the hardy biennial *Hordeum jubatum*, or Crested Barley Grass, are also most useful for mixing with other flowers, and very elegant in themselves. The smallest Feather Grass almost rivals the *Festuca glauca* for edgings. The handsome silver foliage of the *Festuca* contrasts beautifully with red gravel paths, and is said to harbour fewer pests than any other living edging. It is neat, graceful, and easily kept. The only attention required being to cut off the flower-stems in summer; this should not be neglected as the cutting off of the flower-stems maintains the leaves in health and beauty.

Culture of Grasses

As has been said above, ornamental grasses will grow in any ordinary soil with very little care from the gardener, especially the annual species. All kinds, however, by their more luxuriant growth, well repay any attention shown them; above all do they appreciate the constant use of the hoe. It should be kept at work continually breaking up the surface of the soil and destroying weeds.

Annuals.—The hardy annuals are best sown where they have to grow, the seed being put in in April, or in May in colder localities. Except in cold, damp soils and in exposed districts, most hardy annuals are all the better if treated as biennials and sown where they are to grow in July or August. Half-hardy annuals are sown under glass in a temperature of from 60° to 70° F., hardened off in May, and planted out in June; or they can be sown where they are to grow about the middle of May.

Perennials.—Hardy perennials are sown in a nursery bed of fine soil in the open in May and June, and are transplanted to their permanent positions in October; half-hardy species being sown under glass in March to be planted out in the open in the next October. All grasses sown where they are to grow must be thinned when from two to three inches high, if bushy plants are to result. Almost all species thrive in good, well-drained loam, in a sunny, open position. In cold, damp situations it is frequently necessary to treat many of the perennials as annuals and to raise fresh plants each year. Perennial grasses are also propagated by division of roots either in April or October, at which times they should also be planted, if moved, from one part of the garden to another.

Cutting and Drying for Winter Use

Apart from their beauty as rock, marsh, and wild garden plants, many ornamental grasses, when correctly dried, can be used effectively to fill the flower vases, or at least to supplement the cut flowers during the period of shortage of blooms through the winter months. They must, however, be cut at the right time, usually between June and the end of August, and must be correctly dried; otherwise they quickly assume a sickly, dull colour, and the seeds soon drop.

In cutting, which must be done before the heads are fully out, and while the grass is still green, the stalks should be kept as long as possible. The grasses should be tied up in bunches and dried in a cool, airy place. Gathering must take place in fine weather and when the grass is quite dry.

CHAPTER VII

PROPAGATION OF PLANTS

ROCK PLANTS—MARSH PLANTS—SHRUBS

ROCK plants may be propagated by several methods: they may be raised from seed; cuttings may be taken; they can be layered; with a great number the roots may be divided; of some, root-cuttings can be secured; and a few can be propagated by leaf-cuttings. We will describe in detail the various processes.

Sowing Seed

Many alpines may be raised from seed in the open where they are to flower; others must be sown under glass. The requirements of the individual plants will be found in the Alphabetical List of Plants, Chapter XII, p. 143, which gives full cultural details.

Storing Seeds.—Generally speaking, in ordinary circumstances, seeds retain full vitality for one or at the most two years only. From this we gather that *it is better to sow seed saved during the current year. If this is not possible, use seed of the previous season; or, at the utmost, not more than two seasons old.*

If home-grown seed is to be used, the ripening seed-heads should be watched and gathered before the seed is spilled. Be careful, however, to give the seeds ample time to ripen; do not pick them too early. The seed should be removed from the heads and dried in the sun on sheets of paper for a few days, and then sown, preferably, under glass as soon as it is ripe. The seeds of early-flowering species, if so sown, will more than likely furnish plants that will flower the following year. Seed bought from nurserymen and seedsmen is usually not available until late autumn or the spring.

Seed should be stored in a dark, cool place ; it must be kept dry and, above all, in an even temperature. It is best placed in tins with tightly-fitting lids, in thoroughly clean glass bottles (these must be kept in the dark), or in glazed paper impervious to moisture. Soft absorbent paper should not be used, as the seeds will either dry and shrivel up or, if kept in too moist a place, will get damp and will rot. Do not leave the seeds in their pods, as is so often advised, since after a time the pods dry up and draw both moisture and vitality from the seeds.

Sowing Seeds under Glass

Most alpine plants can be raised from seed sown under glass, and the soil for the seed pans should consist of a composition of two-thirds good loam and one-third leaf-mould, together with a good sprinkling of sharp silver sand. The compost should be sieved through a quarter-inch mesh and the soil for covering the seeds through a sieve even finer. This compost will suit the majority of alpines, but some are fastidious and require their own particular mixture ; this they must have or failure will follow. For a plant's likes and dislikes, as regards composts, *see* the Alphabetical List of Plants, Chapter XII, p. 143.

Mix the compost thoroughly, press it gently into the pan or box, and make a firm and level surface just below the rim of the pan. The seed pans should be drained by means of " crocks " or broken pots, an inch and a half to two inches of crocks being required in a box or pan five inches in depth.

Earthenware pans are preferable to boxes, as the earthenware keeps the soil more evenly moist than does the wooden box. The seed should be mixed with ten times its quantity of sand, and should then be sprinkled thinly over the soil in February or March. It must then be watered, not with a can, but by immersing the pans nearly to their brims, thus allowing the water to soak up from the bottom without disturbing the surface soil. Place the seed pans in a frame or greenhouse in moderate but steady heat (about 60° F.). A sheet of glass should be placed over the boxes, and the glass in turn should be covered with a sheet of brown paper to keep out the light. Each day the glass must be lifted so that the condensation may be wiped off, or the seeds will be kept too moist. No further water need, as a rule, be given until the seeds have germinated.

As soon as the seeds are up (in two or three weeks' time, except in the case of certain kinds ; the primula, for example, may take a year or longer), the glass and paper may be removed and the boxes must be lifted by gradual steps up to within six inches of the lights. If the box is left some distance from the glass, weak, straggling seedlings will result. The young plants must be given plenty of air, but should be shaded from the sun. In warm weather it is wise to water the seedlings in the evening, but in the colder weather the watering must be done before lunch-time, or there may be danger of the seedlings "damping-off." In the case of alpines it is better not to water overhead, but to provide moisture, as suggested above for newly-sown seeds, by immersing the pans almost to their rims and thus allowing the water to percolate evenly through the soil. By this means the foliage is not damped, and the danger of "scorching" and "damping-off" is reduced to a minimum.

Sowing Seeds in a Frame.—The seeds may be sown in a frame in exactly the same way as described for sowing in pans or boxes ; the frame should be in a sheltered position, as it is essential to ventilate as much as possible when the weather is sunny and sufficiently calm.

Pricking-off the Seedlings.—When the seedlings are sufficiently large to handle, they must be pricked-off an inch or more apart so that the leaves do not touch, and should be transplanted into boxes of light, sandy soil, which are again put in a position some six inches from the lights. An ordinary wooden seed label will be found very useful in raising the young seedlings from the soil. It should be inserted in the soil an inch or so from the seedling, whose roots may then be gently levered up without damage—never should seedlings be pulled up between the finger and thumb, as this will sorely damage the roots. The seedlings should be transplanted so that the first pair of leaves show just above the soil. They must be set in firmly and should have the soil pressed tightly down round the roots and stems, though care must be taken not to injure any part of the seedling. A thin dibble about the size of a pencil should be used to make the holes for the seedlings, and these must not be made too deep or the roots of the seedlings will not reach the bottom, and the air-pockets left under them will wither their roots. Do not "firm" the seedlings by pressing the earth round the stems with the fingers, but use the dibble, inserting it into the soil, in three or four places round the seedlings, about half an inch from them, and to the same depth as when preparing the holes. This will firm the soil all round the seedlings, right down to the bottom of the roots; the fingers would only press in the surface soil and the roots would be left loose. Strongly-growing seedlings can be potted up at once, the process of pricking-off being unnecessary. In the case of seeds that germinate irregularly, the first batch of seedlings should be pricked-off as soon as they can be handled, and the seed pans should then be replaced so that the remaining seeds may germinate; for it should be remembered that the last seeds to come through usually produce the best plants. Such treatment is necessary with plants like the *Anemone, Auricula, Polyanthus* or *Primula.* After pricking-off keep the seedlings in a close atmosphere and shade them from the sun for a few days until they are established in their new boxes.

Hardening-off and Planting-out.—In March or April the seedlings should be moved into the cold frame. There they are hardened-off and are gradually allowed more and more air, until they are planted out very firmly in the open in May or at the beginning of June.

Sowing Seed in the Open

This is not, as a rule, advisable for alpines, but may be quite successfully carried out in the case of some of the more easy and vigorous kinds.

Weather for Sowing.—Never sow in a cold, wet soil. Wait until the ground has dried sufficiently and until the weather really bids fair to be mild. It is false economy to sow before one feels sure of the weather, just on the off-chance of getting early plants. Dry weather should, therefore, be chosen for sowing, and if seed can be sown just before a gentle shower, or when the weather is likely to be showery, so much the better. Of course, there is a proper time for the sowing of every kind of seed (*see* Chapter XII), but, naturally, this cannot be specified in a series of general instructions, which must, necessarily, apply equally to all. The smaller the seed, the finer should be the soil in which it is sown.

The soil in which the seed is sown should be tolerably dry—dry enough to crumble lightly when worked with the hand. It must not clot together in a pasty mass. Place or position—that is to say, whether in the open air or under protection—also forms an important factor with regard to the time of sowing.

Preparing the Seed-bed.—The seed-bed should be situated in partial shade and should be sheltered from the north and east. The soil must be made as fine as possible, first by breaking up the lumps with a fork and then by raking it thoroughly until the earth is well pulverized. It should contain from ten to twenty per cent of sand—this will make it porous and will enable the air to penetrate freely through it. If the soil is not made fine in this way, many of the seeds will fall down in between the clods and will not germinate; those that do come up may have their tiny roots parched up, as there will be no fine soil through which they can work and so obtain nourishment and moisture. Too rich a soil must not be used, for the seedlings would become tall and straggly, instead of being short and sturdy, which is the ideal at which to aim. The bed must be pressed down firmly and should be left to settle for ten days before seeding. Water the bed thoroughly, if dry, and in March or April, or in late summer, sow the seed thinly in drills running north and south, if possible, and about six inches apart (for time, depth to sow, and distances apart for the different plants, *see* Chapter XII). Sowing in drills is much better than the "broadcast" method, in which the seed is scattered over the entire surface of the seed-bed, for it makes weeding more easy; this is especially so in the case of plants like the Juniper, Rhododendrons, Conifers, etc., where they have to stay in the bed for more than one year. It also saves seed and makes the operation of sowing more easy.

Thick sowing means that the seedlings will get drawn up and will be sickly; thin sowing secures short, sturdy seedlings.

Depth to Sow.—Cover the seeds lightly with fine, sandy soil; the depth of covering required depends on the size of the seed. Minute seeds hardly need any covering at all, a mere sprinkling of sand is sufficient; medium-sized seeds must have a covering a little less than half an inch thick; and large seeds, such as those of the *Iris*, and those like the seeds of the *Hepatica* and *Phlox*, which do not sprout for two years after sowing, can do with from half to one inch of soil over them. Few seeds require a covering of more than an inch. Seeds may be sown slightly deeper out-of-doors than under glass, as the rain is liable to wash out any with too sparse a covering. A good rule is to cover the seeds with a layer of earth twice their own thickness. Do not pat down the soil after the seeds have been planted. Seeds sown in heavy clay soil must not be placed so deep as those planted in medium loam; while in sandy soil a covering of nearly twice that given in a heavy soil will be required. Do not plant the seeds too deep, however, as if so planted, and they ever reach the surface at all, they will have used up most of their strength and energy and will make weak, straggly seedlings. Should the soil of the seed-bed be very dry, the seeds should be soaked overnight in warm water.

Watering the Seeds.—As soon as the seeds have been covered, give them a good watering from a can with a very fine rose; the rose must be very fine or the seeds may be uncovered and washed away. Keep the soil uniformly moist, but not too wet; over-watering causes the seeds to rot and is the most frequent cause of failure. A few strands of black cotton, supported on small sticks, should be stretched across the bed to keep the birds away. If, before planting, the seeds are steeped in a weak solution of paraffin, neither mice nor birds will trouble much about them.

Thinning-out and Transplanting.—In a month or so the seedlings should be large enough to be pricked-off. This should always be done at the earliest possible moment. Delay in thinning and transplanting means that the seedlings become drawn-up and weakly; when they are eventually moved, the fibrous roots become torn and the seedlings will take much longer to become established. They will, in fact, never make such sturdy plants as those transplanted at the right time. In order that the roots shall not be torn, the seed-bed should be watered the evening before the day on which thinning is to take place.

The seedlings should be raised from the seed-bed by means of a small fork; each seedling may then be separated from its neighbours without any damage to its roots, and should be planted very firmly, by means of a small trowel, in a hole just large enough to receive the roots without cramping them or doubling them up, and care must be taken not to leave an air-pocket below the roots or they will soon be parched. If, as in the case of very tiny plants, the seedlings are to be thinned and not transplanted, the fork is not used to raise them, but the unwanted seedlings are pulled up between the finger and thumb, a finger of the other hand being pressed upon the soil to keep the roots of the other seedlings in place. The soil should be firmly pressed back around those seedlings left in the seed-bed or they will be likely to die off. If transplanting is done in the evening, the seedlings will have the cool night in which to recover, and will not be so liable to be scorched as when transplanted in the heat of the day. The reserve garden into which the seeds are transplanted must possess a sunny aspect, should have been well dug, and the soil, if poor, will be all the better for having had good, well-rotted manure mixed with the top three inches of its surface, which, in order to ward off slugs, must be dressed with just sufficient soot to blacken the surface of the soil. A further dressing of vegetable ashes will help to lighten the soil and furnish nourishment for the seedlings. In dry weather the reserve bed should be well watered the day before it is to receive the seedlings, but it must not be made too wet, as the seedlings will not grow if it is made to "cake." The bed should be again watered after the transplanting has been done. If transplanting can be carried out in showery weather, so much the better.

Care of the Seedlings.—In dry weather the seedlings should be watered (but not when the hot sun is on them) and the bed must be well hoed. Tepid water is far more congenial to them than cold water from the tap or a deep tank, and provided the soil is fairly rich, the seedlings should receive no manure until they approach maturity. A dressing of soot water is a sufficient stimulant ; it is also a protection from slugs, and lessens the risk of " damping-off."

Wintering the Seedlings.—In warm and sheltered districts the young plants may be left in the open all winter, but in colder districts it is safer to winter them in a frame, where they should be placed in October. Light, sandy soil and a southerly aspect best suit most seedlings. As much air as possible should be given, but care must be taken to exclude frost and damp ; very little watering should be necessary.

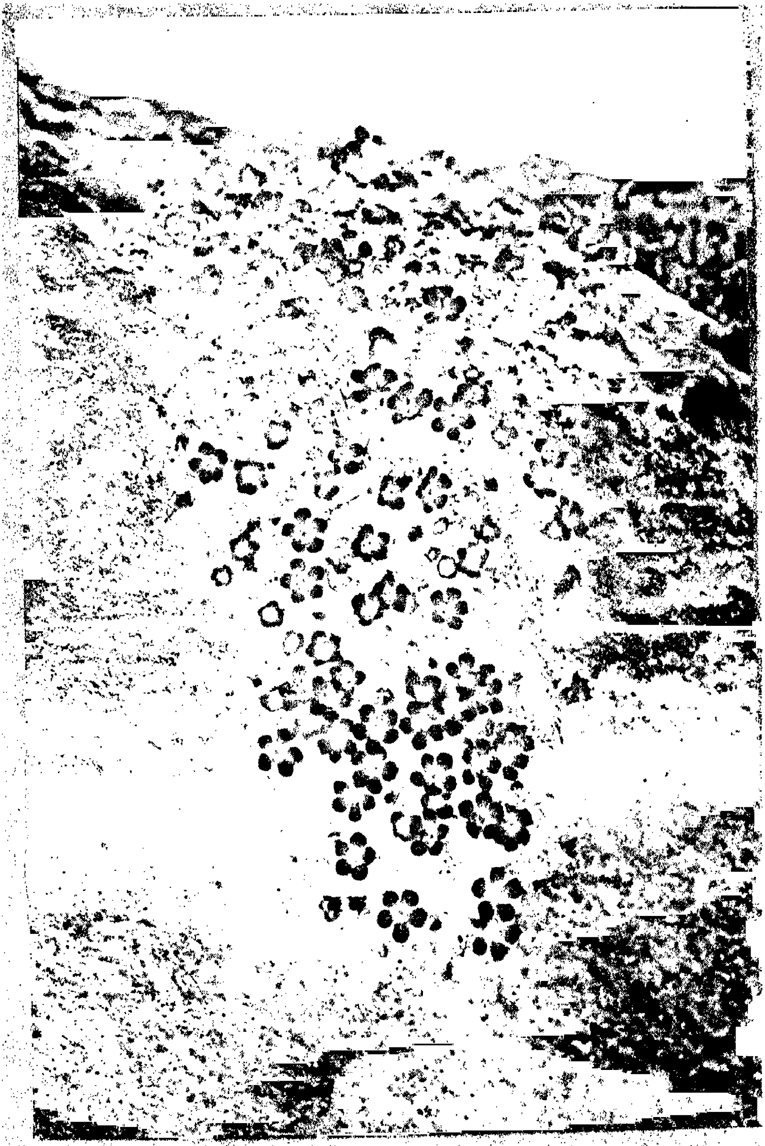
In November of the second season or in March of the third year the plants can be put out in their permanent positions ; tender plants receiving protection during the second winter as afforded in the first. Slugs are the great enemy of young seedlings, and some good soil fumigant should be used to keep these at bay (*see* p. 298).

Propagation by Cuttings

Soil for Cuttings.—Fine silver sand is, perhaps, the best medium in which to strike small cuttings. A light soil through which the air can pass freely is essential to the well-being of all cuttings. That aeration is necessary is proved by the fact that cuttings will strike readily in coconut fibre, a material that is extremely pervious to air and which retains moisture for a considerable period. Powdered charcoal also forms a good medium. Perhaps the free access of air through the excellent drainage in such a position is the reason why cuttings root more freely when placed close to the side of the pot.

How to Take the Cutting.—Cuttings should be taken of shoots that have ripened or which are beginning to ripen, because in wood which is attaining or has attained maturity the callus so necessary to root formation is more readily induced to show itself. The side shoots of plants, low down on the stem, are the best for cuttings, and should be taken when the sap is in full motion, because its return by the bark tends to form the callus, or ring, of granular matter from which the roots proceed. The leaves of a cutting must never be cut off, except in so far as may be necessary at its base in order that it may be inserted in the soil. The leaves are the lungs of the plant, and if they are cut, the sap that they contain will be lost to the cutting and prevented from passing downwards to form the callus. Cuttings of plants that are difficult to strike may frequently be induced to do so by making a ring round them, or by tying a piece of string round them for a short time before they are taken from the parent plant. The downward flow of the sap is arrested by the tightened ligature and a swelling is caused, which forms a callus from which roots are soon emitted. The cutting must be severed from the parent plant just below the ring or band, and the callus formed should be covered when the cutting is inserted in the soil.

In taking cuttings, strong sturdy shoots varying from three to twelve inches in length should be removed from the plant, with a very sharp knife, by a clean straight cut just below a joint. If it is possible to take a " heel " or small wedge-shaped portion of the old wood and bark with it, so much the better. It is then assured that the cutting has been taken where the pith is smallest and there is the greatest width of wood on which the callus will form. If too much heel is taken, it will tend to decay, so the wood must be cut back as near to the joint as possible. The joint need not necessarily be the junction of two stems ; it may equally well be the " eye " from which a pair of leaves have sprung. When no " heel " is taken, the cut must be especially clean and just below a joint, but the joint itself must be left intact. The " heel," from which all ragged edges should be trimmed, when placed in contact with the ground provides a larger surface on which roots can form. The length of the cuttings is decided by the distance between the joints ; when these are, say, an inch apart, the cuttings



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must be from three to four inches long and over half this length must be buried in the soil. Where the distance between joints is less, the cuttings may be shorter, but all hard-wooded cuttings should have at least two or three inches in the ground, and all cuttings must be inserted right to the bottom of the hole prepared for them.

Types of Cuttings.—Cuttings of hard-wooded shrubs, such as the *Broom, Heath, Helianthemum,* or *Myrtle,* are more difficult to strike than those of soft-wooded plants, and for this reason on hard-wooded cuttings the " eyes " on the part of the stem that will be placed underground should be carefully cut out ; this will encourage the formation of roots at these places. Such cuttings are also better if taken with a " heel " of the old wood attached, and if kept fairly short. Cuttings of free-growing hardy plants strike easily without care or attention after being inserted in the soil. The position for all cuttings should, of course, be sheltered and shaded from full sun, and although not necessary with hardy plants, most cuttings when planted in the open do better if covered by a hand-light until the roots have formed. The less hardy and less vigorous plants should be struck in pots or boxes in a cold frame or under hand-lights, while some require artificial heat or the bottom-heat of a propagating box. It may be taken as a general rule that cuttings of soft-wooded plants require more heat than those of hard-wooded plants. " Soft " cuttings, as a rule, should not be struck in the open as, apart from a little heat being desirable, the wind and sun would dry the moisture from their leaves and the roots would never form. A glass covering is, therefore, necessary. Cuttings of soft-wooded plants strike best when they have not too much foliage to bear, and should have the stems, shortened to two or three joints beneath the point from which the foliage springs. Never make the cuttings longer than necessary. In the case of the less hardy plants the soil should be stored in a warm greenhouse for a few days before the cuttings are inserted, and rooting will be more certain and prompt if the cuttings are watered with lukewarm water.

There are several plants, like the pansy or the honeysuckle, whose stems, when mature, are hollow and useless for ordinary cuttings. In such cases the young shoots must be struck, or with the honeysuckle both ends of the cutting may be inserted in the soil.

Shrub cuttings may be taken at three distinct periods, firstly in autumn when the wood has hardened and is quite mature ; secondly in September or August when the shoots have half matured ; and thirdly when the shoots are beginning to ripen in early summer ; the latter time is, perhaps, the best of the three. With many of the hardier shrubs the cuttings may be struck in sandy soil in a sheltered bed in the open (*see* Chapter XII), provided the wood is fully ripe. Half-matured cuttings, even of hardy shrubs, must, however, be treated like those of the less hardy natures and should be struck under glass. Cuttings of hardy evergreen shrubs are also best struck under glass, not because they need heat, but because a close, steady and fairly moist atmosphere is required (*see* Propagation of Shrubs, p. 66).

When cuttings are struck in pots or boxes, the latter should be well drained by an inch layer of crocks at the bottom, and must be clean. If they are dirty, the mould will be likely to stick to them when the cuttings are turned out for transplanting, and the tender new root fibres may be torn.

Making the Compost.—A good compost for striking the cuttings of most plants can be made by mixing equal quantities of leaf-mould and well-sieved loam, and by adding to this a good proportion of sharp silver sand, and then sieving the whole through a quarter-inch mesh. It is always well to sprinkle the surface of the soil which is to receive the cuttings with a layer of sharp silver sand about an inch thick, so that when the dibble is pressed down to form the hole for the cutting, some of the sand will trickle into it and be ready to encourage the production of roots. The sand keeps the soil porous and prevents the base of the cutting from rotting. The soil should be firmed down and the slips inserted at least one and a half inches apart; they must not be placed too close together or they may "damp-off." Press the earth well down round the cuttings, as they will not root if standing loosely in the soil. If the cuttings can be fairly easily pulled from the compost, it may be taken as an indication that they are not planted sufficiently firmly.

Inserting the Slips.—As has been said, cuttings strike more readily when placed at the side of a pot, than when inserted in its centre. Of ordinary plants about seven cuttings can be placed in a four-inch pot. No cutting should be set too deeply, but as in the case of seeds, the depth will depend mainly on the size of the cutting; a good general rule is to set about two-thirds of the length of hard-wooded cuttings in the soil, with soft-wooded cuttings only one-third or one-half should be inserted. Leaves should not be permitted to touch the soil; if they do, they will "damp-off." Water well after insertion.

When using pots or boxes, it is better, but not necessary, to sink these nearly to their brims in ashes or coco-nut fibre, which will keep the soil at an even temperature. Whether the cuttings are covered by plates of glass, glass bells or the lights of a frame, the condensation must be wiped off each morning. Once the cuttings have struck, ventilation must be given whenever possible, and decaying leaves should be removed to avoid any possibility of "damping-off." The great thing is to keep the soil at the same temperature as the surrounding air.

Too much light, air, water, heat, or cold are alike injurious to cuttings freshly inserted under glass. A close, equable temperature and a moderate degree of moisture should be maintained until the cuttings have "rooted." This condition is best attained by covering them with a bell-glass or hand-light and by shading them if not placed in a shady situation. Once they have struck, which will be in about three weeks, the cuttings should be gradually given more ventilation and hardened-off until they can be potted up singly for the greenhouse, or planted out in the desired situation in the open.

Soft-wooded cuttings soon form roots, and can often be potted-off in a month or so's time ; cuttings of hard-wooded shrubs, however, take root less quickly and should not be disturbed for at least a year (sometimes eighteen months) after being struck. To give these cuttings ample room to grow, they are usually planted at least six inches from each other in rows ten inches to a foot apart.

Propagation by Layers

This is an easy and very sure method of propagation, usually effected about July, though it may be carried out at any season of the year. It consists in the production of roots on one or more of the lower shoots of the plant to be reproduced. An upward cut, just below a joint, is made in the layer or shoot ; the incision passes from the underside through to the centre of the shoot, and is from about one inch to three inches in length, according to the size and nature of the plant to be propagated. The aim is to produce a " tongue " of bark and wood that can be wedged open and pegged down into the soil ; the more the tongue is kept open when placed in contact with the earth, the better the chance of rooting.

The shoots which are chosen for layering must be perfectly healthy, and should be semi-matured. It is usual to layer several shoots at a time, and when the cuts have been made, as described above, the earth all round the plant is stirred up to a depth of three inches and the layers are pegged down firmly, so that the open tongues come well in contact with the soil. Little mounds of earth some six inches high are then piled up over the layers, which are pressed firmly down into the earth, and well watered. An addition of sharp silver sand to the soil (often in the proportion of fifty per cent of its volume), as in the case of cuttings, helps the layers to root. The outer end of the shoot, beyond the cut, should be turned upwards to check the flow of the sap, and all buds not required to form shoots in the new plant should be removed. When the layers have rooted firmly, they may be cut away from the parent plant, potted up or planted out, preferably in autumn. The layers of soft-wooded plants will be found to root in six weeks or so; shrubs like the veronica will take two or three months to form roots; while with hard-wooded shrubs, like the daphne or rhododendron, it will be a year or more before the layers can be severed from the parent plant.

Propagation by Runners.—This is, perhaps, the most simple method of propagation, though only possible with certain plants, namely those that throw out long thin stems or runners which grow out over the surface of the ground. At intervals along these stems will be found joints, and wherever one of these joints comes in contact with the soil and so remains for some time, roots form and foliage is thrown up.

To assist in this method of propagation, the earth should be stirred up to a depth of two or three inches all round the plant and the runners must be firmly pegged down into it, at the required number of joints. Young roots will form and after a few weeks they will be strong enough to support the new plant which may be cut away from its parent, and potted up or transplanted.

A better method, but one entailing a little more work, is to sink to their rims pots of good sandy soil exactly under the joints of the runners and to peg the latter down firmly to the soil in the pots. This operation provides an easier way of transplanting and one that is beneficial to the young plant, as the roots are not then so easily injured when replanting.

Propagation by Offsets

Offsets afford yet another means of propagation suitable to many herbaceous perennials and to many alpines. These offsets are growths forming young crowns round the older central crown, and may be carefully separated from the parent crown, when large enough, and can be potted up into small pots or transplanted. About a month after the plant has flowered will be found to be the best time to accomplish this operation.

Propagation by Division

Alpines are best divided in August and September, or in March and April; the former time in the case of spring and early summer bloomers, and autumn flowerers at the latter period. The clumps should be lifted with their roots as entire as possible, that is, with a good "ball" of earth round the fibres. This is done by inserting two forks vertically downwards, one on either side of the plant and backs facing each other, and then by levering the clump and its roots gently upwards. When the plant has been lifted, don't, as is so often done, use a spade to cut the roots apart, but carefully divide the plant up into as many crowns as possible by means of a sharp knife, which will do the minimum injury to the roots. The strong new outer crowns are those that should be retained and replanted, the old inner roots being discarded. The stems that have already borne flowers should be cut away from the new crowns, so that only the young and vigorous shoots from the base remain. These should be replanted as soon as possible, or should be potted up in a compost of half turfy loam, a quarter sand, and a quarter leaf-mould.

Propagation by Root-Cuttings

This is another and easy method of propagation, eminently suitable in the case of plants with fleshy roots. If the roots are examined in the late autumn or early spring, they will be found to be covered with small, whitish knobs or shoots; these are the "eyes" from which the new growth will spring. Cuttings of these roots from two to eight inches in length, in accordance with the size of the plant, and each having an "eye," are taken. They are planted just below the surface and a few inches apart in light, sandy soil in partial shade, or in a frame with a warm, close atmosphere. The cuttings are inserted vertically with that part of the root which was nearest the stem uppermost.

In propagating plants whose roots are fleshy, but rather more fibrous in nature, the larger root-stems should be cut away from the crowns with as many of the smaller fibrous roots as possible adhering, and should be planted as advised above, but should be left intact and not be cut up into small pieces. In the case of plants whose roots creep horizontally just below the surface of the soil, cut the roots into pieces from one to six inches in length, each piece having an "eye" or bud from which shoots can spring, and plant horizontally in the soil at the same depth as they were before being dug up.

The root-cuttings will require frequent watering during the following few months, and will be benefited by the occasional application of a little weak manure water. It is essential to keep the surface of the soil loose. The cuttings can be planted out in the autumn or in the following March or April.

Propagation by Leaf-Cuttings

Propagation by leaf-cuttings is a very interesting method, not often resorted to, and then only in the case of plants with succulent or thick, spongy leaves, and soft veins. A healthy leaf is taken and some two-thirds of the stalk is cut away; the leaf is then planted stalk downwards in a propagating case in equal parts of sandy loam and leaf-mould. The whole leaf is then pinned firmly backside-down, so that it cannot move, on to the mould in the propagating case (temperature 70° F.), and is allowed plenty of moisture, though the bed must be well drained and not be permitted to become stagnant, or the leaves will rot. In a short time little plants will grow. These can be transplanted or potted up as soon as they have roots strong enough to support them. This method of propagation, which may be resorted to at any season when fully-matured leaves are available, is particularly suitable in the case of such plants as *Ramondia pyrenaica*, *Ramondia Heldreichi*, etc.

Ringing

Hard-wooded plants which are difficult to propagate by other methods may be increased by a process known as *ringing*, and which consists in removing a small narrow ring of bark all round the stem in the place in which the formation of roots is desired. Care must be taken not to cut deeply into the stem—indeed, it is better to peel off the outer bark only, and not to cut into the inner wood at all; no hindrance is then offered to the ascent of the sap. A callus is formed on the bark which forms the upper edge of the ring, and this thickens as time goes on, and ultimately, on contact with the soil, emits roots. Branches and trailing stems operated on in this way should be firmly pegged down, and earth should be drawn over the incision. Layers should be brought into as erect a position as possible, and they may be shortened back. (*See also* paragraph on Layering, p. 100.)

CHAPTER VIII

THE WALL GARDEN

WHEN laying out a garden on a piece of sloping ground, one will almost invariably be confronted with the problem of what to do with the banks, which of necessity will be formed. They are usually made into grass slopes, which are difficult to keep well trimmed, and are consequently apt to look untidy if labour is at a premium. Alternatively, they may be planted with shrubs or may be covered with some trailing plant.

There is, however, a far better solution to the problem; the unwanted bank may be converted into a wall garden bright with colour and full of interest during the greater part of the year. The wall, too, will economize space—permit of a larger lawn, perhaps—for it may be nearly vertical, while the bank could not safely be built at a steeper angle than forty-five degrees. The wall, too, will enable the owner of a small garden, where there is no room for a larger rock garden on orthodox lines, to grow the ever-popular alpines and rock plants. There is yet another use to which the " dry " wall can be placed, and that is to form a boundary for the formal sunk garden; in this case the wall will be quite low, rarely more than three feet in height—usually less, and should be made of stones thinner and flatter than those used for the ordinary retaining wall.

The " Dry " Wall

The " dry " wall, as it is called, is constructed of stones —usually sandstone or limestone—from two to eight inches in thickness. They may be of any size within reason, and untrimmed. Stones are better than bricks, for they provide cooler and moister root-beds for the wall plants. They should be bonded, that is, laid in layers so that the lateral extremities of a stone lie over the centres of the two stones in the row immediately below it. If the wall is to be over three feet in height, some means of strengthening the structure will be found necessary, unless very large stones are being used. This may be done by the use of ties, i.e. long stones built endways into the wall with their ends penetrating the bank. These should be in layers ; the individual ties being some six feet apart in the layer, and one layer eighteen inches above the other, care being taken to have the centres of the stones above between those of the ones below, or, in other words, the stones should be staggered. This structure serves to keep the wall secure and firm. The stones should be long in proportion to their height, and are best when their upper surfaces are flat or even cupped. When placed in position they should be inclined slightly backwards, so that they are lower at the back than at the front, the larger and more weighty stones being kept at the base of the wall ; the rain will then be collected and drained into the soil at the back of the wall to furnish moisture for the roots. No cement is used, but earth is rammed firmly into the crevices between the stones, sufficient mould being used to keep the stones about one inch apart, horizontally and vertically ; the greater the slope of the wall, the more the soil that may be used between the stones. This soil must be rammed well in to the back of the wall, so that there is mould

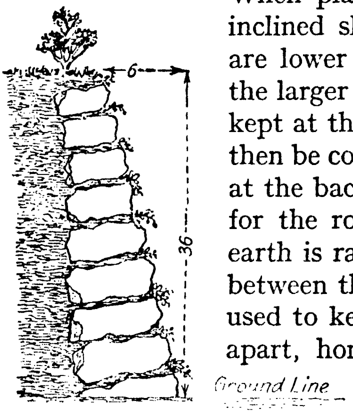


FIG. 5.—CONSTRUCTING THE " DRY " WALL.

The wall should incline slightly back at an angle of about 1 in 6 from bottom to top; that is, in a wall 3 feet high the base will project 6 inches beyond the top.

from the very front right through to the earth supporting the wall at the back. In addition, there should be a layer of well-" firmed " earth between each row of stones, and no " air-pockets " must be left in the crevices, or the roots of the plants will be dried up.

The Compost

A mixture of good loam, cow-manure, and leaf-mould makes the best compost for the wall garden. The first essential is to provide a good foundation for the wall; this should be about ten inches deep and a shade wider than the base of the wall. Here the earth is rammed well down until a solid footing is provided. Now lay the first layer of stones, using the largest available, and place them so that their upper sides form one straight, horizontal line. If the stones are of moderate size, the gaps left laterally between them may be about three inches; the smaller the stones, the smaller the gaps between them. Next pack the vertical crevices between the stones very tightly with the compost of good loam and cow-dung, and then cover the whole row with a layer of soil one inch thick and well rammed down. On this is placed the next row of stones, properly bonded as explained above; this is in turn covered with earth, and the process is repeated until the wall has reached the required height.

The wall should not be built exactly vertical, but the top should incline slightly backward at an angle of about one in six, that is to say, in a wall four feet high the base will project eight inches farther forward than the top. It is thus firmer and more easy to plant. The top of the wall is best left flat so that the rain may soak through.

The " Double " Wall

The above remarks, of course, apply to the single wall, but when the wall is not to be used as a " retainer " (to support a bank), and where space will permit, there is no reason why the wall should not be " double " and have a face on both sides, each sloping inward towards the top. The space between the two walls would be filled with earth to form the rooting medium for the larger plants ; each wall would thus support the other. There is no need to go into details of the construction of the " double " wall, for they are self-evident from the foregoing instructions.

Planting the Wall

It is, of course, easiest to plant the wall as it is constructed ; the roots may then be spread out as they should be, and can be well covered with soil. Larger plants may thus be employed than when the planting is done when the wall has been completed, at which time it is very difficult to insert the roots deeply into the crevices. It is never wise, however, to use very big plants. If the roots are dipped into mud just before planting, they will establish themselves all the more easily.

March and April, when root-growth is very vigorous, are the best months in which to construct and plant the wall garden. The plants have then ample time to become fully established before the winter sets in. Wall gardens may also be planted in September, but the early spring is the better time, except in the case of dry, arid situations.

As an alternative to planting the roots in April or September it is, of course, possible to sow seeds in the crevices in spring. The best way to do this is to mix the seeds with a little well-sieved moist, sandy soil, and to press it into the chink in the wall. A small piece of moss inserted into the crevice will keep the seed moist and will prevent it from being pulled out by birds or by some other agency.

The plants, above all, must not be overcrowded. When planting, the gardener should bear in mind the size to which the plants will eventually grow, and he should be careful not to set a vigorous grower directly above some smaller-growing subject, for, if care is not taken in this direction, a slow-grower will soon be smothered by a more vigorous neighbour that has been planted too close.

Selecting the Plants

In selecting the plants the locality, climate, and aspect of the wall must all be carefully considered, so that suitable subjects may be chosen. The list that follows should make this an easy matter. It will be noted that the great majority of the plants given in our list (p. 111) as suitable for the wall garden thrive best in the sun. A wall garden situated in the shade, however, can be made anything but drab and uninteresting, as the names of possible shade-lovers (*see* list, p. 311) will testify. For the shady wall in a cool position such hardy ferns as the *Aspleniums, Polypodiums* or the *Scolopendriums* must not be overlooked.

When planting the wall garden, it is just as necessary to have a scheme of colour grouping in mind as it is when planning the herbaceous border. It will, of course, be more difficult to carry this out systematically when planting as the wall is being built, than when inserting the plants in an existing wall; considerably more care is, therefore, needed in the former case. In planting when the wall is already standing, every effort should be made to set the plants with their roots well spread out, and so that they may penetrate well into the soil at the back of the wall. A little thoroughly-rotted cow-manure inserted with the roots will prove beneficial. A plant should never be placed at the *top* (*a*) of a vertical joint between the stones, its roots would then be likely to become dried up. Rather should it be planted in the crevice (*b*) just above the centre of a stone: that is, at the *bottom* of the vertical joint.

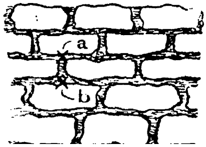


FIG 6. — HOW TO PLANT THE "DRY" WALL.

A plant should never be placed at the *top* (*a*) of a vertical joint between the stones; it should be set in the crevice (*b*) at the *bottom* of a vertical fissure

A good six inches of compost should

be firmly rammed down on to the top of the wall, and in this soil, at intervals, should be placed large stones, for these will help to keep the soil in place and will furnish moist, cool sites for the roots of such plants as *Rock Roses, Zauschnerias, Wallflowers, Geraniums, Antirrhinums* or *Snapdragons, Sedums,* and *Saxifrages*—all ideal subjects with which to crown the wall garden.

Using an Existing Wall

We have rather taken it for granted that the wall garden has had to be constructed. It must, however, be borne in mind that there is many an old wall, either of brick or of stone, that, although rather dilapidated, can with a little ingenuity be made into a delightful wall garden. Some mortar may have to be scraped out here and there, and it may be necessary to dislodge an occasional brick now and again and replace it with compost; but, provided sufficient soil can be inserted, almost any wall plant may be grown in it successfully. It must be remembered, too, that the smaller plants require very little soil indeed, especially those loving drier sites. A wall supporting a bank is, naturally, an ideal home for the larger wall plants, for it has the deep, moist soil of the bank behind it, and into this the roots will eagerly run.

Care of the Wall

In spring, after the frosts of the winter, the wall garden should be carefully looked over, for it will probably be found that in places the frost has raised the soil and has loosened the roots of the plants. These will need "firming-down" again, and fresh soil should be pressed firmly into the crevices to replace that which has fallen out. At the same time all vacancies caused by the death of plants should be filled with fresh specimens from the nursery or reserve garden.

PLANTS FOR THE WALL GARDEN

NOTE.—For Fuller Cultural Details, *see* Chapter XII, *Alphabetical List of Plants for the Rock, Wall, and Paved Gardens*, p. 143.

Name	Colour	Height in Inches or Habit	Time of Flowering
Acæna adscendens	Grey-green Leaves	Trailing	Summer
Acæna Buchananii	Blue-grey Leaves	Trailing	Summer
Acæna microphylla	Bronzy-green Leaves	Trailing	Summer
Acæna sanguisorbæ	Grey-green Leaves	Trailing	Summer
Acantholimon glumaceum	Pale Pink	6	July–August
Acantholimon venustum	Rosy-pink	5–6	Summer
Achillea tomentosa	Yellow	6–9	June–August
Æthioenma grandiflorum	Rose	10	May–July
Alyssum alpestre	Yellow	7	June
Alyssum montanum	Yellow and Lemon	3	May and June
Alyssum saxatile	Yellow	6–12	April and May
Androsace (various)	Pink, White	3–6	Summer
Anthyllis montana	Rosy-pink	4–5	May–June
Antirrhinum (various)	Various	Various	Summer
Aquilegia (various)	Various	12–18	Summer
Arabis albida fl. pl.	White	Trailing	May–June
Arabis androsacea	Rose	Trailing	Spring
Arenaria balearica	White	Creeping	May and June
Asperula Gussonii	Rose	4	May–August
Asperula hirta	Rosy-pink	3–4	March–Sept.
Astragalus danicus albus	White	5	May–July
Aubrietia (various)	Various	Trailing	April–June
Campanula cæspitosa	Blue	5	June and July
Campanula carpatica	Purple, Blue, or White	6–12	May–Sept.
Campanula fragilis	Blue	5	Summer
Campanula garganica, etc.	Mauve	5	June–Sept.
Celmisia coriacea	White	12–18	Summer
Centranthus ruber	White and Red	24	Summer
Cerastium Biebersteinii	White, Silver Foliage	Trailing	Summer
Cerastium tomentosum	White, with Silver Leaves	6	June–August
Ceratostigma plumbaginoides	Cobalt Blue	9	July–Sept.
Chieranthus Allionii	Orange-yellow	12–18	April–May
Chieranthus alpinus	Yellow	6	May and June
Chieranthus Cheiri (various)	Various	24	April and May
Codonopsis ovata	Pale Blue	Trailer	July–Sept.
Cortusa Matthioli	Purple	10	June
Conandron ramondioides	Purple-pink	5–6	Summer
Corydalis lutea	Yellow	6	June–Sept.
Cotyledon umbilicus	Yellow	6	June
Cyananthus lobatus	Purple-blue	Trailer	June–August
Dianthus alpinus	Rose	5	June
Dianthus deltoides	Red or White	6–8	June
Dianthus glacialis	Reddish-purple	3	Summer
Dianthus Knappii	Yellow	12	July–Sept.
Dianthus plumarius, etc.	Various	8	June
Draba aizoon	Yellow	3	March and April
Dracocephalum Isabellæ	Blue	6–8	August
Dryas octopetala	White	Creeper	Summer
Erigeron mucronatus	White and Red	6	Summer
Erinus alpinus	Purple, Pink, White	4	May–July
Eriogonum flavum	Yellow	Trailer	August
Erodium macradenum	Pale Violet	6	June and July

Name	Colour	Height in Inches or Habit	Time of Flowering
Erodium Manescavi	Purplish-red	12–18	June and July
Erodium romanum	Purple	5	April–May
Gaultheria nummularioides	White	Trailer	Sept. and Oct.
Gypsophila prostrata	Pink or White	5	June
Gypsophila repens	White and Pink	4–6	May–Sept.
Helianthemum (various)	Various	6	May–Sept.
Haberlea rhodopensis	Lilac, White	4–6	June–July
Helichrysum bellidioides	White	4	July–Oct.
Hypericum gracile	Yellow	5	June and Aug.
Hypericum tomentosum	Yellow	6–9	August–Oct.
Iberis sempervirens	White	6	May and June
Jasione perennis	Blue	9	June–July
Leontopodium alpinum (Edelweiss)	Creamy-white	6	June–Sept.
Linaria alpina	Violet	3	Summer
Linaria cymbalaria	Mauve and Orange	3	Summer
Linum alpinum	Blue	5	May and June
Lippia nodiflora	White, Pink, Purple	Trailer	July and August
Lychnis alpina	Rose	6	April–June
Lithospermum prostratum	Blue	Trailer	Summer
Meconopsis cambrica	Orange-yellow	12	Summer
Mertensia primuloides	Blue, Yellow Centre	6	May–Aug.
Morisia hypogœa	Golden-yellow	3	April and May
Nepeta Mussinii	Lavender-blue	12	May–October
Œnothera missouriensis	Yellow	12	Summer
Œnothera taraxacifolia	White, Tinted Rose	12	Summer
Onosma tauricum	Lemon-yellow	10	May–July
Onosma albo-roseum	White	6	Summer
Origanum pulchrum	Pinky-purple	9	Summer
Origanum hybridum	Rosy-pink	9	June–July
Phlox subulata	Pink	4	Early Summer
Phyteuma comosum	Blue	3	June–July
Primula Allionii	Pale Pink, White Eye	5	April
Primula auricula	Golden-yellow	6	Early Summer
Primula Clusiana	Violet-red, White Eye	6–9	April–May
Primula viscosa	Rosy-purple	2–7	March–June
Ramondia pyrenaica	Purple	6	May–August
Santolina incana	Yellow	10	June–August
Saponaria cæspitosa	Rosy-pink	3	Summer
Saponaria ocymoides	Rosy-pink	6	Summer
Saxifraga (various)	Various	Various	Jan.–July
Sedum acre aureum	Yellow	Creeping	Summer
Sedum album, etc.	White, Pink, etc.	6	Summer
Sempervivum arachnoideum	Reddish-pink	5	June–August
Sempervivum globiferum	Yellow	5	Summer
Sempervivum tectorum	Red	10	Summer
Silene alpestris	White	5	June and July
Silene Schafta	Rose	6	June–August
Teucrium Polium	White, Yellow, Purple	6	Summer
Thymus serpyllum	Purple, Crimson	Trailing	June–August
Tunica saxifraga	Rosy-pink or White	Trailing	June–August
Veronica guthreana	Blue	6	Summer
Wahlenbergia serpyllifolia	Violet-blue	Trailing	May and June
Zauschneria californica	Vermilion	12–18	July–Sept.

Malby

TROPÆOLUM POLYPHYLLUM

CHAPTER IX

THE PAVED GARDEN

OF late years there has been a great reaction against the very formal gardens of our grandfathers, and those responsible for designing and laying out gardens have endeavoured to obtain effects, both as regards form and colour grouping, similar to those which nature herself so unfailingly accomplishes. Thus we see the reason for the present popularity of the wild garden, the rock garden, and the modern paved garden, all of which aim at providing as natural as possible a setting for so many delightful flowers which, either singly or in masses, are only seen at their best when grown as nature intended that they should be.

The paved garden consists of a path or any area, of whatever size and shape, covered with " crazy " paving or flagstones, in the crevices between which dwarf rock plants and creepers are planted or, better still, are allowed to seed naturally.

Selecting the Plants

In constructing the paved garden, however, it must not be thought that to plant naturally is to plant without order or reason. Nature is severely orderly in her workings and everything has its allotted place. Only certain plants are, therefore, suitable to the paved garden ; these are dwarf in nature and many of them will thrive although trodden on and walked over to a considerable degree, for it must be remembered that the prime reason for a path is its utility as a means of progress. A limited number of plants only, therefore, must be planted in the interstices of the paving, and these must appear to have seeded naturally from surrounding borders or from the rock garden, and must in no way impede the pedestrian, although the paved garden should not be subject to constant traffic. More paved gardens are spoiled by indiscriminate and excessive planting than by any other cause. If rock-work of any kind forms the boundary to the path or the paved garden, allow the plants covering it to encroach a little way, and in an irregular manner, over the flagstones. This informality will add a touch of nature and will help to erase the traces of the handiwork of man.

Laying the Stones

As to the stones used, the majority should not be less than about ten inches in diameter or the paving will have a patchy appearance. Stones rectangular in shape are best for paths, but for covering square, circular, and oval spaces the flags may be of any shape and size, provided they are not too regular.

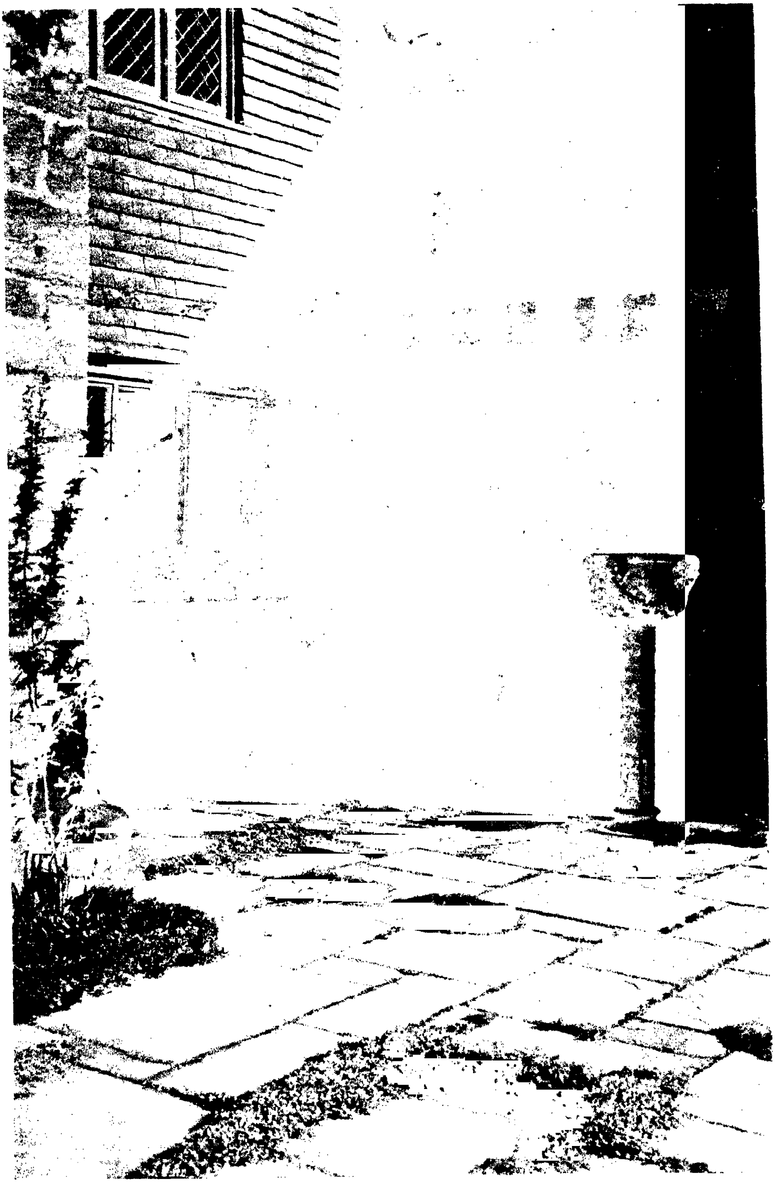
The site of the paved garden must, of course, be well drained ; in fact, the foundations should be constructed in the same way as those of any ordinary pathway. Over this base is placed a layer of sand some three to six inches in thickness, and on this the flags are laid in an irregular pattern and so that there are gaps of some two or three inches between the stones. (*See* Crazy Paving, p. 18.) These spaces should be filled with good loamy soil mixed with a quarter part well-decayed manure, preferably cow-dung, and an eighth part old mortar, and in this are inserted the plants in small groups or in isolated tufts. A selection of plants suitable to this purpose will be found on p. 115.

The most suitable site for the paved garden is in connection with the rock garden, the bog garden, or the water garden. A paved garden flanked by low hedges of lavender will be a favourite haunt of all garden-lovers.

PLANTS FOR THE PAVED GARDEN

Name	Colour	Height in Inches or Habit	Time of Flowering
Acæna Buchanani	Blue-grey Leaves	Trailing	Summer
Acæna microphylla	Bronzy-green Leaves	Creeping	Summer
Acæna pulchella	Grey Leaves	Creeping	Summer
Achillea tomentosa	Yellow	6–9	June–August
Achillea herba-rota	White	6	May
Aloysia nodiflora	White or Purple	6	May–Sept.
Alyssum montanum	Yellow and Lemon	3	May and June
Antennaria tomentosa	Silver Leaves	Creeping	Summer
Antennaria dioica	Silvery-grey Leaves	3	Summer
Arabis lucida var. variegata	Golden Foliage	3	May–July
Arenaria balearica	White	Creeping	May and June
Arenaria laricifolia	White	6	June
Armeria maritima	Rose, Red, Lilac, and White	6–12	June–July
Aubrietia (various)	Purple and Red	4–6	April–June
Bellium minutum	White and Yellow	3	May–September
Calamintha alpina	Violet	4	June–August
Campanula cæspitosa	Blue	5	June and July
Campanula garganica	Mauve	Trailing	June–September
Campanula muralis	Purple-blue	4	June–August
Campanula pulloides	Blue or Mauve	5	June–August
Campanula pusilla	Deep Blue	3	June–August
Campanula Waldsteiniana	Blue-mauve	3–6	June and July
Cerastium arvense compactum	White	3	June–August
Cerastium tomentosum	White, with Silvery Leaves	6	June–August
Corydalis lutea	Yellow	6	June–September
Cotula dioica	Yellow	Trailing	Summer
Cotula squalida	Yellow	Trailing	Summer
Crucianella stylosa	Rose	5	May–September
Dianthus deltoides	Red or White	6–8	June
Dryas octopetala	White	3	June and July
Erinus alpinus	Lilac-rose	4	May–July
Erinus alpinus albus	White	4	May–July
Erinus alpinus carmineus	Red	4	May–July
Erodium chamædryoides	White, veined Pink	3	May–September
Erythræa diffusa	Rose	3	Summer
Frankenia lævis	Flesh	Creeping	June–August
Globularia cordifolia	Blue	4–8	Summer
Gypsophila cerastioides	White	3	June–September
Helianthemum croceum	Yellow	6	May–September
Helianthemum tigrinum plenum	Salmon Pink	6	May–September
Helxine Solieroli	Green Foliage	Creeping	Flowers Inconspicuous
Herniaria glabra	Green	Creeping	Flowers Inconspicuous
Hutchinsia alpina	White	6	June–August
Hypericum nummularium	Yellow	3–6	Summer
Hypericum reptans	Yellow	4	June–September
Leontopodium alpinum (Edelweiss)	Creamy-white	6	June–September

Name	Colour	Height in Inches or Habit	Time of Flowering
Linaria æquitriloba . .	Lilac	4	June
Linaria alpina	Violet	3	Summer
Linaria cymbalaria . .	Mauve and Orange	3	Summer
Linaria cymbalaria var. pallida	Purple	3	May–September
Linaria repens	White	7	May–September
Lithospermum prostratum	Gentian Blue	6	June and July
Lotus corniculatus fl. pl.	Yellow	6	August
Mazus pumilio . . .	Purple	3	June–August
Mentha Requienii . .	Lilac	Creeping	Summer
Mimulus radicans . . .	White and Violet	Creeping	Summer
Morisia hypogœa . . .	Golden-yellow	3	April and May
Myosotis Reichsteineri cæspitosa	Blue	2	April–May
Œnothera rosea . . .	Pink	5	June–September
Oxalis acetosella rosea .	Purple Leaves	4	Summer
Paronychia argentea . .	Silvery Leaves	Creeping	Summer
Paronychia serpyllifolia .	Green Leaves	Creeping	Summer
Potentilla alba . . .	White	5	June–August
Potentilla nitida . . .	Pale Pink	4	June–September
Primula Juliæ	Magenta	4	April and May
Sagina pilifera . . .	White	Creeping	Summer
Sagina pilifera var. aurea	White	Creeping	Summer
Saponaria ocymoides (and var. alba)	Rose and White	6	Summer
Saxifraga Clibrani . .	Crimson-red	5	May–June
Saxifraga hypnoides gemmifera	White	5	May–June
Saxifraga muscoides atropurpureum	Red	4	May–June
Saxifraga trifurcata Wallaceii	White	6	March–June
Sedum acre aureum . .	Golden-yellow Leaves	3	June–September
Sedum album	White	6	May–June
Sedum anglicum . . .	Pink and White	4	June–August
Sedum farinosum . . .	White and Pink	3	July
Sempervivum arachnoideum	Reddish-pink	5	June–August
Sempervivum montanum	Rosy-red	4	July
Sempervivum tectorum .	Red	10	July
Silene acaulis	Pink	2	June–August
Thymus citriodorus argenteus	Silver Leaves	8	Summer
Thymus lanuginosus . .	Grey Leaves	5	Summer
Thymus serpyllum album	White	3	June–August
Thymus serpyllum coccineum	Crimson	Carpeting	June–August
Tunica saxifraga . . .	Rosy-pink or White	5	June–August
Veronica alpina . . .	Blue	5	June–September
Veronica canescens . .	Pale Blue	Trailer	June–August
Veronica rupestris . .	Blue	Trailer	June–August
Veronica saxatilis . . .	Blue	5	June–September
Viola calcarea	Blue	6	May and June
Viola cornuta	Purple, White, and Yellow	6	April–September
Viola cornuta purpurea .	Blue	6	May and June



[Maltby

The paved garden.

By courtesy of] [*Messrs. Hayes & Sons, Ambleside*

A well-planned rock garden with cascades and rock pool.

CHAPTER X

THE WATER GARDEN

BY the water garden we mean a garden of plants growing actually in water or in the saturated ground adjacent to water where the soil is periodically submerged. Few features in a garden are more attractive and interesting than the water garden. The pond selected for the water garden can be large or small; it may be constructed by damming off a section of a river, or a tiny stream may be utilized to provide the water supply. It is, however, useless to attempt water gardening unless a continuous supply of water, the year through, is available. A very small amount, even a trickle artificially laid on, will suffice, providing it is continuous. But a water garden which is liable to dry up in the summer is a sure source of disappointment. Where a stream exists, the difficulty of creating a pond is a comparatively small one, granted that by some means, such as a sluice, the flow of water may be regulated; sudden rushes of water in flood times are disastrous to many plants, for example, *Nymphæas*, *Nuphars*, etc. In any event, whether the water is derived from a stream or is brought to the pond by means of pipes, a low-lying piece of land should be selected, preferably one where a natural depression already exists. It should be possible to look down on the plants; it should not be necessary to look up at them, as is sometimes the case when the water garden is composed of artificial tanks. The pond—assuming that one does not already exist—should be made about three feet in depth at the deepest point.

The water garden need not necessarily consist of a pond or lake, it may take the form of a small stream connecting, perhaps, a series of little pools, and eventually emptying itself into a pond or a bog garden at the bottom of the slope down which it runs. The stream may be wide or narrow, deep or shallow. In every case the bottom should be puddled with clay or concreted, and stones, set in the cement, should be placed along its banks (*see* photo, p. 125) to hide its artificial sides and to break the evenness of its outline. In the pockets formed by these rocks may be planted ferns and bog plants. The progress of the stream should be checked at intervals by small dams of stones; these will form a series of shallow pools from which the water may be allowed to trickle in a miniature cascade to the bed of the stream below. The variety of lay-out that this feature permits is, of course, limitless. In constructing a water garden on these lines, the reader will find no surer guide than Nature. Try to place the stones in artistic agreement one with another, so that the final picture may harmonize with its surroundings. Study natural effects and copy them as closely as possible.

Making the Pond or Stream

This is to-day neither so difficult nor so expensive an undertaking as many people imagine. The outlay in proportion to the pleasure derived from the completed garden is indeed small. We should first consider the situation of the artificial water garden, and remember that the aim is to follow nature as nearly as possible. Let the water garden, therefore, occupy the lowest-lying part of the ground, and to assist in the production of natural effects, the water garden may often be associated advantageously with the wild garden, or the rock garden. Size can be made to suit requirements and the surrounding conditions. A pond only three to four feet in diameter can be made quite enchanting; while a long, narrow vista of water some fifty feet in extent, if space permits, will certainly provide one of the most charming and restful features in any garden. Shape is dependent on space and the other features of the garden. Harmony must ever be the goal of the architect of the water garden, and it should be borne in mind that a series of sharp and erratic curves will never produce a pleasing and natural outline. The design must be simple; curves may be used, of course, but they must be long, sweeping, and natural. On the other hand, not a single curve need be employed; the severely simple square or rectangular pool has a charm all its own. In such cases the garden becomes more formal, the pool may well be bordered by a paved walk, and in the crevices between the stones may grow small wall or rock plants. Where the more irregular and informal shape has been chosen, the grass may be allowed to clothe the gently sloping banks right down to the water's edge, and a knoll of outcropping rock will add beauty to the picture, especially if the water garden is near the rock garden. Marsh plants can be planted in groups from the very brink of the pool up to the higher slopes, where bamboos and other shrubs may be used to form a screen and background.

Depth of Water Required

Few water plants, except very strong growers, which are better excluded even from the moderately large water garden, require a greater depth of water than two and a half feet. To allow for the thickness of the lining of the pond and for the inclusion of soil to nourish the roots, it will be necessary to excavate to a depth of somewhat over three feet. The actual walls of the pond itself are best cut perpendicularly, if concrete is to be used. They must be left sloping if the pond is to be "puddled" with clay, but the earth should be thrown back several feet from the pond, so that the banks on which the marsh plants are to grow may be made to slope very gently right down to the water's edge. A steep or sharply convex slope down to the water makes the pool difficult of access and is also by no means easy to plant satisfactorily.

Now as to the impervious lining to keep the water in the pond. There are three that can be used: puddled clay, bricks and mortar, or concrete and cement. We recommend the last of the three as being the easiest to work and the most lasting. Where, however, the subsoil consists of a stiff, sticky, impervious clay, puddling—provided it is well done and is carried to a depth of about ten inches—is a cheaper and equally successful process. In "puddling," the clay should be cut into small pieces, well watered, and then thoroughly kneaded until it forms a soft, sticky surface.

Digging out the Pond

It must be remembered that all constructional work will have to be hidden and that a permanently moist margin of soil some two to three feet wide to accommodate marsh plants will be desirable round the pond. It will, therefore, be necessary to excavate to a width sufficient to allow for this; that is to say, supposing it has been decided that the pond shall be ten feet wide, a hole three feet deep all over and sixteen feet wide will have to be dug. This allows for a two-and-a-half-foot margin of moist earth, as well as six inches for the thickness of the wall on each side, if concrete is used. The concrete bottom of the pond need not be more than five inches in thickness.

When the excavation is complete, all loose soil must be dug out and the bottom made thoroughly firm by pounding with a heavy beater. If the soil over which the concrete is to be laid is left loose, it will shrink away and cause the concrete to crack and leak.

Mixing the Concrete

Concrete is a mixture of cement, sand, gravel, broken stones, brick rubbish or similar materials in proportions varying from one part of cement to two of other ingredients for good work to one part of cement to twelve of other ingredients for unimportant work. A useful mixture consists of one part of cement, two parts of sand, and five parts of gravel, broken stone, or brick. Good lime is often used instead of cement. The cement or lime which binds the gravel or other material together is technically called the *matrix*, and the material embedded is called the *aggregate*. Any of the various cements in general use may be used in the manufacture of concrete, but the amateur is recommended in all cases to use Portland cement, this being by far the best and strongest. If lime is used, it should be carefully slaked before being mixed with the aggregate. All lumps should be broken, and enough water added to reduce them to powder. After being allowed to stand for forty-eight hours the slaked lime should be passed through a screen. In making concrete, it is important, in the first place, that the aggregate, whatever it may be, shall be deposited on a clean place—if on old boards, as scaffold boards, so much the better—so that no dirt shall get mixed up with it. The concrete itself should be made on boards, nailed together on ledges or on three putlogs placed on the ground parallel to one another, forming a rough platform. The aggregate and the cement or lime used as the matrix must then be placed on the boards, the aggregate being measured out first, and the proper portion of cement being also measured out and thrown upon it. Whilst still in the dry state, the materials should be turned over two or three times. The heap is then wetted with water poured over it from a large water-pot fitted with a fine rose, and the whole is mixed by again being turned over once or twice, so that the materials may be thoroughly amalgamated.

The principal precautions to be taken in the process of mixing are:

(1) The water should be added to that portion of the material which the "shoveller" is working upon and not

to the mass indiscriminately, as this allows the cement to sink through the interstices of the aggregate before attaining partial solidity.

(2) The full quantity of water should be added during the third turning, not afterwards.

(3) The quantity of water applied must be regulated according to the purpose for which the concrete is intended. For our present purpose the concrete must be in a kind of semi-liquid condition.

(4) The "shoveller" must turn the concrete completely over when in the act of casting it from one heap to another; he should not take it up in the shovel and deposit it without changing the position of the ingredients.

When using quick-setting Portland cement, no time must be lost between the operations of mixing and depositing the cement where it is required.

When well mixed and in a semi-liquid condition, place a layer of concrete six to nine inches in thickness over the bottom of the pond and smooth it down firmly; next build a retaining wall of boards parallel to the earth walls, but six inches nearer the centre of the pond. The gap between the wood and the earth side, when filled up with concrete, will form the two walls A and A′. The supporting boards B and B′ are, of course, not removed until the concrete is thoroughly dry. Now construct the two inner walls C and C′, each two and a half feet from the outer retaining walls, but ten inches shorter, that is lower, than them. An inflow pipe D and an outlet pipe F should be inserted before the concrete work is completed. As soon as the concrete is quite dry, it should be roughed over, wetted, and then thoroughly worked over with cement-wash two inches in thickness, care being taken to see that the corners E and E′ are perfectly watertight. If boiled linseed oil is added to the mixed cement-wash in the proportion of one part of oil to twelve of the mixed cement-wash, the latter will be rendered thoroughly waterproof. One of the waterproof cement-washes can be bought ready-made, if preferred. A word of warning may here be given—it is unwise, quite apart from the shade cast and the dead leaves and twigs that will fall into the water, to construct a pond under or near trees, for their roots run a considerable distance underground, and are in time likely to crack the cement unless it is very strong.

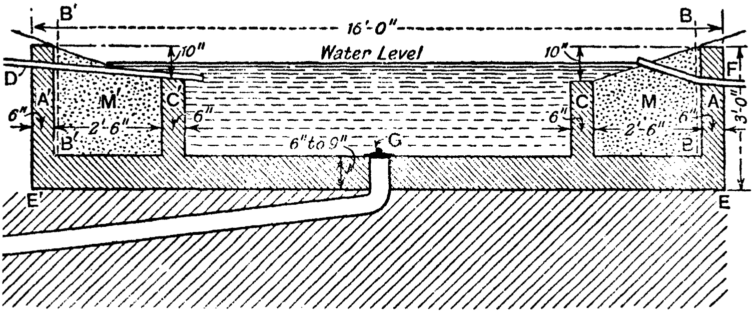


FIG. 7.—MAKING THE LILY POND.

A and A′ are walls of concrete 6 inches thick; C and C′ are also of concrete and of the same thickness, but are 10 inches shorter than the outer walls. B to B′ shows the overall width of the pond; M and M′ are pockets of saturated soil for bog plants; D is the inflow pipe, and F the outflow. The plug G enables the pond to be emptied and cleaned.

The Water Supply

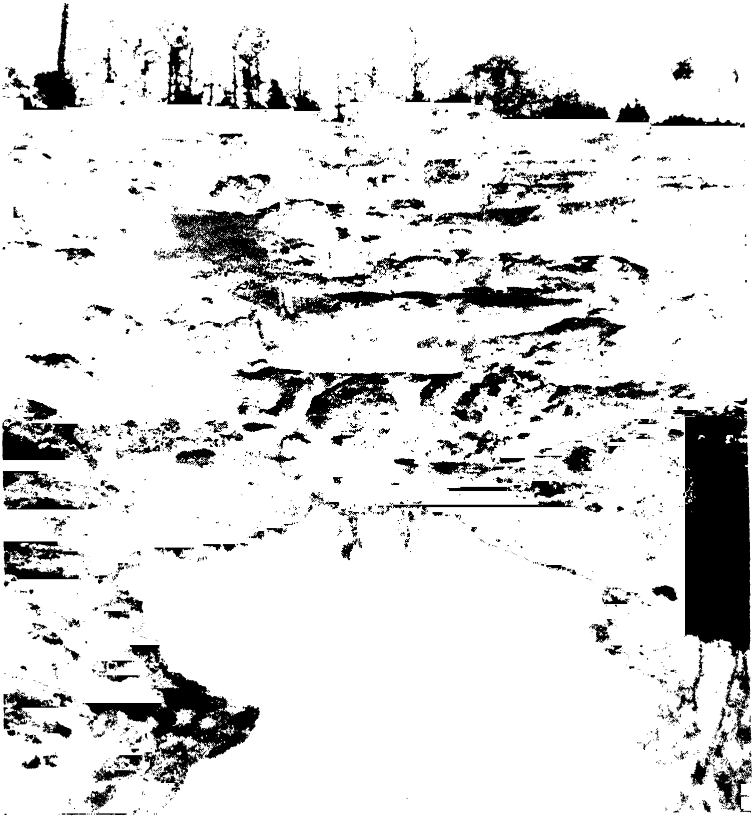
For the great majority of aquatic plants a constant flow of water is not a necessity; the inflow pipe D may, therefore, be dispensed with, and water lost in evaporation may be periodically replaced by means of the hose or by bucket. It should be remembered that, if the border of marsh plants around the pond is to prove successful, the water must never be allowed to fall below the tops of the inner walls C and C′, or the marshy condition of the banks within the outer containing walls will not be maintained. Likewise, the water-level must be kept just below the tops of the walls A and A′ or too much of the surrounding ground will become boggy. The outflow pipe F is, therefore, a necessity to carry off superfluous water. A plug and outflow G at the bottom of the pond is a useful feature; the water may then be drained away occasionally so that the pond can be cleaned and rearranged as required.

A scheme that will entail more work and a little additional expense is to cut short the inflow pipe D at some little distance from the pond, and to arrange for a series of artificial cascades, rocky ledges, and shallow pool-beds over which the water may trickle on its way to the pond. It is needless to say that careful planting of rock and marsh plants along the margin of this little watercourse can produce some very charming effects.

When the concrete is thoroughly dried, the spaces M and M′, between the retaining walls A and C and A′ and C′, should be filled with a compost of loam and peat, or loam and leaf-mould, which should be banked up so that the tops of the walls A and A′ are covered with soil and hidden from sight. The surrounding ground should be made to slope up gently from this point so that turf may, in places, run right down to the water's edge, whence the water and marsh plants may best be surveyed. At other points rocks may be cemented on the tops of the walls A and A′ and sometimes just below the water-level. These shelves under the water will form ledges on which aquatics can be planted, and the rocks, which can be built up as miniature cliffs on one side of the pond, will present an excellent contrast to the smooth turf running down to the water's edge on the other.

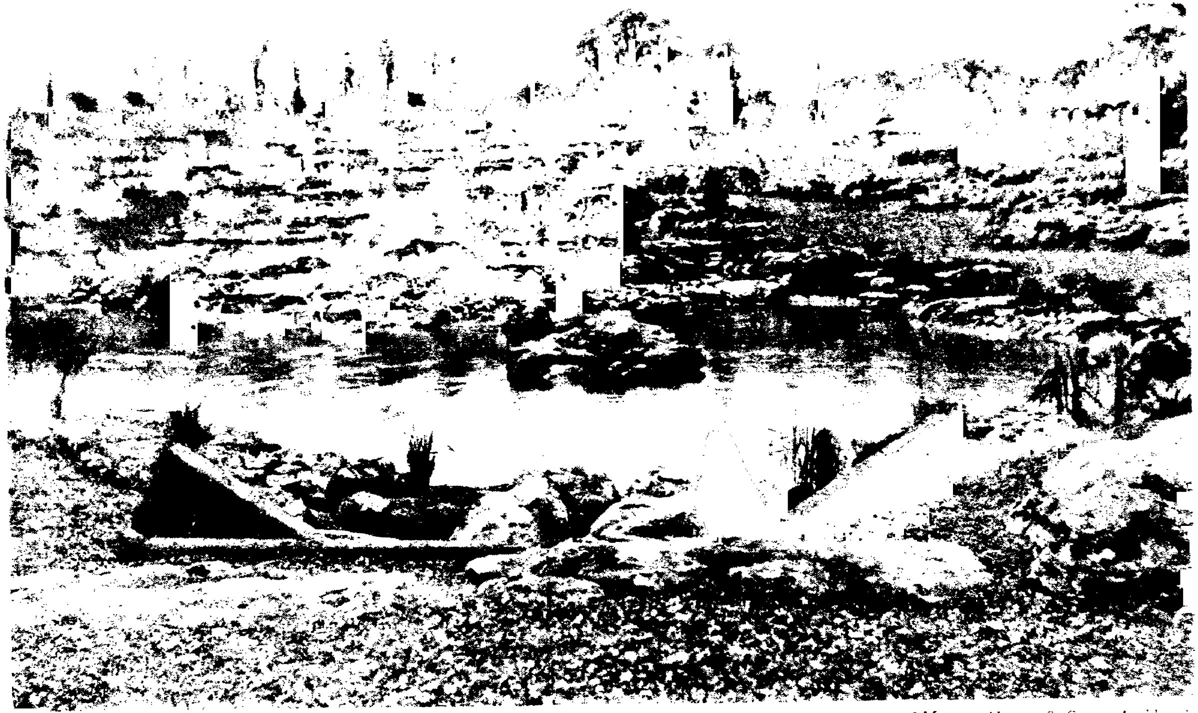
Planting

In the moist pockets M and M′ are planted the bog or marsh plants, those requiring four to six inches of water over their crowns being set under water lower down the bank, while a shade higher up the moist shelf should be grouped those subjects flourishing on cool, moist, swampy banks. The bottom of the pond should be covered with a layer of soil some twelve inches deep, in which the purely



By courtesy of] [*Messrs. Hayes & Sons, Ambleside*

Where rock and water gardens meet. Note the naturalness of the rock strata



ourtesy of] [*Messrs. Hayes & Sons, Ambleside*

A water garden with cascades and rock garden in the background.

aquatic plants may root. The plants which may suitably be grown in and around such a pond naturally vary with its size. If the pond is large, such water-lilies as *Nymphæa Marliacea, N. Gladstonei,* and *N. colossea* may be grown, also *Nuphar advena, Stratiotes aloides,* and *Sagittaria.* Intermixed with these may be grouped such vigorous plants as *Alisma, Hottonia palustris, Aponogeton distachyum, Cyperus longus,* and *C. vegetus.* The giant Mace Reed (*Typha latifolia*) should be included wherever space permits. Where the pond is a small one, there are dwarf water-lilies which occupy a comparatively little space, among the most beautiful being *Nymphæa odorata minor, N. tetragona,* and *N. Leydekeri fulgens.* These have the further advantage of growing freely and well in as little as a foot of water. *Nymphæas* cannot feed on water alone, and the soil of their pond or the water around their roots must be enriched, if they are to do really well. This is best done by means of small balls of cow-manure mixed with straw or litter to bind it, made firm, and thrown into the water round the roots of the plants just as the young growth is starting.

The best method of planting water plants in a pond or lake is in pans or flat baskets filled with fibrous loam and a little cow-manure. The pans or baskets are then gently lowered into the water in the desired situation. A layer of enriched mud should cover the bottom of the pond, the baskets resting in this so that the roots of the plants can work out and ramble at will. So well do many plants thrive if provided with conditions of this kind that, where the space is limited, protection must be afforded

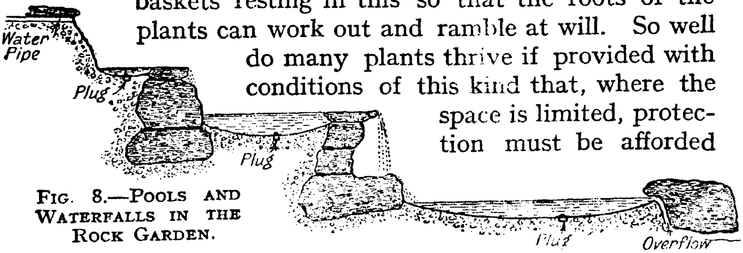


FIG. 8.—POOLS AND WATERFALLS IN THE ROCK GARDEN.

The rocks forming the pools in the above diagram must be set in cement to keep the structure firm; the pools are of concrete and lined with cement. A continuous trickle, artificially fed if necessary, will keep the miniature falls running.

to the less vigorous species grown, or they will soon become crowded out and choked. Such plants as the *Nuphars*, pretty as they are, are great offenders in this direction. They spread their strong rhizomes and roots all over the bottom and strangle weaker growers. The Reed Grass, *Phragmites*, is another of these greedy plants, and its runners should be fished for occasionally with a strong rake and cut off.

The borders of the pond should be hidden with such plants as spread out on the surface of the water, while rooting in the firm soil at the margin. Amongst these are: *Myosotis palustris* (the Water Forget-me-not), *Comarum palustre*, *Calla palustris*, and *Veronica Beccabunga*. These, prettily grouped, will clothe the actual margin, while beyond them the taller-growing plants, such as *Irises*, *Spiræas*, *Marsh Marigolds*, with the *Sedges*, *Grasses*, and *Rushes*, thrive on the slightly swampy banks. Many of the *Ferns* and *Primulas* love such a situation as this, among them the beautiful *Osmunda regalis* and *Primula japonica*. The *Bamboos*, which are also at home in these conditions, make effective clumps as a background for smaller plants.

Of the ordinary garden plants which prefer a moist soil, many will, if planted in such a swampy border and provided they are well nourished, grow in amazing luxuriance. *Spiræa Kamtchatica* will make a plant from eight to ten feet high, while several of the *Lobelias*, notably *L. fulgens*, *L. cardinalis*, and *L. splendens*, will often grow from four to five feet in height. *Iris lævigata* should certainly be included, and *I. orientalis* and *I. aurea* will sometimes make clumps that will reach a height of seven feet. Nearly all aquatics are best planted in spring, but can be planted at almost any time, save, perhaps, in the depth of winter.

Many aquatics that are not really hardy may be introduced for summer decoration in pots sunk either wholly or half-deep in water. These must be removed in winter to warm water tanks under cover of glass. Every year something new in aquatics is being introduced, for there seems to be no limit to the multitude of aquatics native to the tropics, and very many of them are supremely beautiful.

Care of the Water Garden

Once planted, many of the aquatic and marsh plants are better if left undisturbed and are only lifted and replanted when they appear to be unhealthy and ailing. Others, however, are much like hardy herbaceous perennials in their requirements and do best if they are lifted, divided, and replaced every third or fourth spring. Some of the water-lilies make tremendous leaf-growth and consequently little bloom, for the leaves cover the surface of the water and prevent the sun's rays from playing on it. This warming of the water by the sun's rays is essential to most aquatics, especially the *Nymphæas*, or water-lilies. The strong leaf-growth must, therefore, be periodically cut away in the spring, and, if necessary, the roots should be divided. This thinning-out will produce more bloom on the plant and will restore adequate breathing-space to its neighbours.

Many people are troubled with an objectionable slimy green growth called *Blanket Weed*. This covers the surface of the water in hot, dry weather, usually in spring and summer. It may be disposed of by adding 4 oz. of copper sulphate or 1 oz. of potassium permanganate to every 500 gallons of water in the pond. A second application should be made after an interval of a week, should the first have proved unsuccessful. These solutions will harm neither plants nor fish.

Propagation of Aquatic Plants

Some aquatic plants, as they are termed, are propagated by seed, but are mostly increased by division of the roots. The seeds, when sown, must be placed under water. In other respects aquatics require the same general treatment as other herbaceous plants.

The Culture of Water-lilies

Most of the *Nymphæa* grow best in from one and a half to three feet of water; the stronger growers flourish in a depth of from four to six feet. No lilies should be planted in water of less depth than a foot or eighteen inches; in water shallower than this they are easily damaged by frost. The rhizomes, or roots, should be packed in a compost of fibrous loam, leaf-mould, and cow-dung, and must be placed in an openwork basket, out of which the roots may ramble over the bed of the pond and seek nourishment. Where a layer of deep rich mud stretches over the pond bottom, the plants will grow luxuriantly and there will be little need of an additional stimulating compost. The roots should be securely tied into the basket, which should be weighted so as to act as an anchor when the plant is lowered into the water. Any time between April and June is suitable for planting these lilies, and at this time, too, the roots may be divided; this is usually advisable every three to four years. Don't plant the clumps too close together; study the colour-scheme while planting, and remember that it is useless to try to grow water-lilies under overhanging trees.

Plants with small or weak rhizomes are best planted in a tub for the first year or so, afterwards they may be transferred to the pond. Where tubs are used, a little water must occasionally be added to make up for evaporation. The lilies must not be permitted to become overcrowded; should this happen, they must be thinned out in spring, preferably in May. The rhizomes must be cut through between the growth-producing stems, and the roots should be dragged up from the bottom of the pond. There are many of the more vigorous-growing kinds, such as *N. Marliacea*, that will require this treatment every two to three years; that is, twice as often as is necessary in the case of their less luxuriant fellows, some of which hate being disturbed and will thrive for many years in one spot. *N. odorata* and *N. Leydekeri* are examples of these.

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A formal lily pool.

When plants make profuse leaf-growth, the foliage is thrust up out of the water and stifles the blooms—other leaves spread out over the water and prevent the sun's rays from reaching and warming it. Water-lilies will only thrive in sun-warmed water, therefore a severe thinning of these inordinate leaf-growths must be periodically made. If this is done, a great improvement in the bloom of the plant operated upon, and of its neighbours, will be noticed. This thrusting of the leaves above the water surface is also a sign that the plant requires deeper water or needs to have its crowns thinned out.

Water-lilies in Tubs

Lilies are often grown in tubs, for space will often not permit of their being grown in any other manner. Tubs are not, however, recommended where other means are available. The tub should be painted or tarred outside, but not inside. It should have a vent and plug in the bottom for drainage, and must be sunk with the brim just below ground-level. A surround of crazy paving will help to hide the rim of the tub, and the sun's heat that it will reflect will warm the water and stimulate the growth of the plant grown in it. The more vigorous-growing kinds of *Nymphæa,* unless thinned vigorously every two years, should not be grown in tubs, but there are many small species, as for instance *N. odorata minor* and *N. tetragona.*

Plant the lilies one in each tub, in weighted baskets, as in pond planting, but the compost must not be too rich (equal parts loam and leaf-mould will suffice) or the leaf-growth will be too luxuriant. Six inches of soil should cover the bottom of the tub. It is quite unnecessary to change the water, but evaporation must be compensated for. The surface should be cleared of Blanket Weed and slime, and a sharp look-out must be kept for water snails and other pests that frequent the plants, especially when they are grown in tubs.

PLANTS FOR THE WATER GARDEN

NOTE.—For Fuller Cultural Details, *see* Chapter XII, ***Alphabetical***

Name	Common Name	Height in Inches	Colour	Time of Flowering	Position and Soil
Alisma plantago	Water Plantain	30	Rosy-white	June–Aug.	Water Margin. Ordinary
Aponogeton distachyum	Cape Water Hawthorn	—	White	May–Oct.	In Water. Ponds, Fountains, Basins. Ordinary
Butomus umbellatus	Flowering Rush	30	Pink	June–Aug.	Sheltered. Water or Muddy Bank. Ordinary
Calla palustris	The Bog Arum	—	White	June–Aug.	Firm Soil at Pond Margin
Cyperus longus	The Galingale	20–30	Brown	August	Soil at Margin
Hottonia palustris	Water Violet	—	Lilac with Yellow	May and June	Water Edge. Ordinary
Limnanthemum peltatum	Fringed Golden Buck Bean	3	Yellow	July–Aug.	In Water. Ordinary
Menyanthes trifoliata	Bog-Bean	12	White and Pink	March–June	Shallow Water at Boggy Bank. Ordinary
Myosotis palustris semperflorens	Forget-me-not	—	Blue with Yellow Throat	May–Aug.	Ordinary Soil at Margin of Water
Nuphar advena	Yellow Water-lily	—	Yellow with Red Anthers	June–Aug.	In Water in 10 inches of good Loam, Leaf-mould and Cow-dung
Nuphar luteum	Yellow Water-lily	—	Yellow	June–Aug.	In Water in 10 inches of good Loam, Leaf-mould and Cow-dung
Nymphæa alba plenissima	White Water-lily	—	White, Double	June–Aug.	In Water in 10 inches of good Loam, Leaf-mould and Cow-dung
Nymphæa atropurpurea	Water-lily	—	Crimson-purple	June–Oct.	In Water in 10 inches of good Loam, Leaf-mould and Cow-dung
Nymphæa Attraction	Water-lily	—	Purple-crimson, veined with White at Tips	June–Oct.	In Water in 10 inches of good Loam, Leaf-mould and Cow-dung

PLANTS FOR THE WATER GARDEN

List of Plants for the Rock, Wall, Paved, and Water Gardens, p. 143.

Habit	Sun or Shade	Depth of Water in Inches above Crowns	Still or Running Water	Time and Method of Planting	Time and Method of Propagation
Tufted	Sun	Bog—12	Slow-moving	March	Seeds, March, in Peat under Water; Division, April
Spreads over Surface of Water	Sun or Shade	6–30	Slow-moving	March, in Weighted Basket	Root Division or Offsets, March
Tufted	Sun	Bog—12	Still	March	Division of Roots, March
Spreads over Surface of Water	Sun	Bog—12	Still	March	Division of Roots, March
Tufted	Sun	Bog—6	Still	March	Root Division, March
Flowers at Water-level	Sun	10–40	Still	March	Seeds, Shallow Water, April; Division of Roots, April
Spreads over Surface of Water	Sun	12	Slow-moving	March	Division of Roots, or Seed, March
Spreads over Surface of Water	Sun	Bog—12	Still	March	Division, Oct. or March; Cuttings, in Mud, Summer
Spreads over Surface of Water	Partial Shade	6	Still or Slow-moving	Nov. or March, 5 inches apart	Seeds (open), May; Plant-out Oct.; Cuttings (frame), July; Division of Roots, Nov. or Oct.
Spreads over Surface of Water	Sun	6–15	Still	April–June, in Weighted Basket	Seeds, Rich Soil in Basket in Water in Winter; Division, April
Spreads over Surface of Water	Sun	6–15	Still	April–June, in Weighted Basket	
Spreads over Surface of Water	Sun	40	Slow-moving	April–June, in Weighted Basket	Seeds, ¼ inch deep in Rich Loam in Basket sunk in Water in Spring; Division, April
Spreads over Surface of Water	Sun	30	Slow-moving	April–June, in Weighted Basket	
Spreads over Surface of Water	Sun	10–40	Slow-moving	April–June, in Weighted Basket	

Name	Common Name	Height in Inches	Colour	Time of Flowering	Position and Soil
Nymphæa aurora	Water-lily	—	Orange-red	June–Oct.	In Water in 10 inches of good Loam, Leaf-mould and Cow-dung
Nymphæa caroliniana perfecta	Water-lily	—	Pink, Copper Leaves	June–Oct.	In Water in 10 inches of good Loam, Leaf-mould and Cow-dung
Nymphæa Conqueror	Water-lily	—	Bright Red	June–Oct.	In Water in 10 inches of good Loam, Leaf-mould and Cow-dung
Nymphæa colossea	Water-lily	—	Flesh-coloured	May–Aug.	In Water in 10 inches of good Loam, Leaf-mould and Cow-dung
Nymphæa Ellisiana	Water-lily	—	Rose	June–Aug.	In Water in 10 inches of good Loam, Leaf-mould and Cow-dung
Nymphæa Escarboucle	Water-lily	—	Vermilion	June–Aug.	In Water in 10 inches of good Loam, Leaf-mould and Cow-dung
Nymphæa formosa	Water-lily	—	Pale Pink, Centre deeper Pink	June–Oct.	In Water in 10 inches of good Loam, Leaf-mould and Cow-dung
Nymphæa Froebelii	Water-lily	—	Crimson	June–Oct.	In Water in 10 inches of good Loam, Leaf-mould and Cow-dung
Nymphæa Gladstonei	Water-lily	—	White, Shaded with Pale Green	June–Oct.	In Water in 10 inches of good Loam, Leaf-mould and Cow-dung
Nymphæa Gloriosa	Water-lily	—	Red	May–Oct.	In Water in 10 inches of good Loam, Leaf-mould and Cow-dung
Nymphæa James Brydon	Water-lily	—	Rosy-crimson	June–Oct.	In Water in 10 inches of good Loam, Leaf-mould and Cow-dung
Nymphæa James Falconer	Water-lily	—	Crimson	June–Oct.	In Water in 10 inches of good Loam, Leaf-mould and Cow-dung
Nymphæa Leydekeri fulgens	Water-lily	—	Crimson	June–Oct.	In Water in 10 inches of rich Loam, Leaf-mould and Cow-dung
Nymphæa Leydekeri purpurata	Water-lily	—	Purple, Crimson Centre	June–Oct.	In Water in 10 inches Loam, Leaf-mould and Cow-dung

Habit	Sun or Shade	Depth of Water in Inches above Crowns	Still or Running Water	Time and Method of Planting	Time and Method of Propagation
Spreads over Surface of Water	Sun and Shelter	20	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division in April
Spreads over Surface of Water	Sun and Shelter	10–20	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division in April
Spreads over Surface of Water	Sun and Shelter	10–40	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division in April
Spreads over Surface of Water	Sun and Shelter	36–40	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division, April
Spreads over Surface of Water	Sun and Shelter	20–24	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division, April
Spreads over Surface of Water	Sun and Shelter	40	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division, April
Spreads over Surface of Water	Sun and Shelter	10–40	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division, April
Spreads over Surface of Water	Sun and Shelter	20	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division, April
Spreads over Surface of Water	Sun and Shelter	40	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division, April
Spreads over Surface of Water	Sun and Shelter	36	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division, April
Spreads over Surface of Water	Sun and Shelter	20	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division, April
Spreads over Surface of Water	Sun and Shelter	10–40	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division, April
Spreads over Surface of Water	Sun and Shelter	24	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division, April
Spreads over Surface of Water	Sun and Shelter	10–18	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division, April

Name	Common Name	Height in Inches	Colour	Time of Flowering	Position and Soil
Nymphæa Luciana	Water-lily	—	Bright Rose	June–Oct.	In Water in 10 inches of rich Loam, Leaf-mould and Cow-dung
Nymphæa lucida	Water-lily	—	Crimson	June–Oct.	In Water in 10 inches of rich Loam, Leaf-mould and Cow-dung
Nymphæa Marliacea chromatella	Water-lily	—	Primrose-yellow, Tinted Rose	June–Oct.	In Water in 10 inches of rich Loam, Leaf-mould and Cow-dung
Nymphæa Marliacea carnea	Water-lily	—	Flesh, shading to White	June–Oct.	In Water in 10 inches of rich Loam, Leaf-mould and Cow-dung
Nymphæa Marliacea ignea	Water-lily	—	Crimson	June–Oct.	In Water in 10 inches of rich Loam, Leaf-mould and Cow-dung
Nymphæa Meteor	Water-lily	—	Crimson, streaked with White	June–Oct.	In Water in 10 inches of rich Loam, Leaf-mould and Cow-dung
Nymphæa Moorei	Water-lily	—	Yellow	June–Oct.	In Water in 10 inches of rich Loam, Leaf-mould and Cow-dung
Nymphæa Mrs. Richmond	Water-lily	—	Pale Pink	June–Oct.	In Water in 10 inches of rich Loam, Leaf-mould and Cow-dung
Nymphæa Newton	Water-lily	—	Rosy-vermilion	June–Oct.	In Water in 10 inches of rich Loam, Leaf-mould and Cow-dung
Nymphæa odorata exquisita	Water-lily	—	Rose-pink	June–Oct.	In Water in 10 inches of rich Loam, Leaf-mould and Cow-dung
Nymphæa odorata maxima	Water-lily	—	White, with Yellow Stamens	June–Oct.	In Water in 10 inches of rich Loam, Leaf-mould and Cow-dung
Nymphæa odorata minor	Water-lily	—	White	June–Oct.	In Water in 10 inches of rich Loam, Leaf-mould and Cow-dung
Nymphæa Robinsonii	Water-lily	—	Crimson	June–Oct.	In Water in 10 inches of rich Loam, Leaf-mould and Cow-dung
Nymphæa sanguinea	Water-lily	—	Deep Crimson	June–Oct.	In Water in 10 inches of rich Loam, Leaf-mould and Cow-dung

Habit	Sun or Shade	Depth of Water in Inches above Crowns	Still or Running Water	Time and Method of Planting	Time and Method of Propagation
Spreads over Surface of Water	Sun and Shelter	12	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division, April
Spreads over Surface of Water	Sun and Shelter	20–30	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division, April
Spreads over Surface of Water	Sun and Shelter	36	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division, April
Spreads over Surface of Water	Sun and Shelter	36	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division, April
Spreads over Surface of Water	Sun and Shelter	30	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division, April
Spreads over Surface of Water	Sun and Shelter	10–30	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division, April
Spreads over Surface of Water	Sun and Shelter	10–40	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division, April
Spreads over Surface of Water	Sun and Shelter	10–40	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division, April
Spreads over Surface of Water	Sun and Shelter	10–40	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division, April
Spreads over Surface of Water	Sun and Shelter	20	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division, April
Spreads over Surface of Water	Sun and Shelter	20	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division, April
Spreads over Surface of Water	Sun and Shelter	20	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division, April
Spreads over Surface of Water	Sun and Shelter	20	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division, April
Spreads over Surface of Water	Sun and Shelter	20	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division, April

Name	Common Name	Height in Inches	Colour	Time of Flowering	Position and Soil
Nymphæa tetragona Helvola	Water-lily	—	Sulphur Yellow	June–Aug.	In Water in 10 inches of rich Loam, Leaf-mould and Cow-dung
Nymphæa tuberosa	Water-lily	—	White	June–Oct.	In Water in 10 inches of rich Loam, Leaf-mould and Cow-dung
Nymphæa tuberosa Richardsoni	Water-lily	—	Double White	June–Oct.	In Water in 10 inches of rich Loam, Leaf-mould and Cow-dung
Nymphæa tuberosa rosea	Water-lily	—	Rose	June–Oct.	In Water in 10 inches of good Loam, Leaf-mould and Cow-dung
Nymphæa W. B. Shaw	Water-lily	—	Rose	June–Oct.	In Water in 10 inches of good Loam, Leaf-mould and Cow-dung
Nymphæa William Falconer	Water-lily	—	Crimson	June–Oct.	In Water in 10 inches of good Loam, Leaf-mould and Cow-dung
Orontium aquaticum	Golden Club	12–18	Yellow	May–June	In Water. Ordinary
Peltandra virginica	Water or Arrow Arum	24–36	White	July	Ordinary Soil at Water Margin
Pontederia cordata	Water Plantain	—	Blue in fine Tufts	June–Oct.	Shallow Water. Good Loam
Ranunculus aquatilis	Crowfoot	—	White	—	Water. Margin in Mud
Ranunculus lingua major	Giant Golden Spearwort	30–50	Yellow	June–Aug.	Water Margin in Mud. Ordinary
Sagittaria japonica fl. pl.	Snowy-flowered Arrowhead	24–30	Double White	July–Oct.	Shallow Water at Margin. Clay, Sandy Loam, and Rotted Manure
Sagittaria latifolia	Arrowhead	12	White	June and July	Shallow Water at Edge. Clay, Sandy Loam, and Rotted Manure
Sagittaria sagittifolia	Arrowhead	30	White, dashed with Pink	June–Aug.	Shallow Water at Edge. Clay, Sandy Loam, and Rotted Manure
Stratiotes aloides	Water Soldier	20	White	June	Shallow Pond. Ordinary
Typha latifolia	Giant Reed Mace	70	Brownish-black	Late Summer	Edge of Sheltered Pond. Ordinary

Note.—Although Nymphæas can be raised from seed as stated, the usual method of

Habit	Sun or Shade	Depth of Water in Inches above Crowns	Still or Running Water	Time and Method of Planting	Time and Method of Propagation
Spreads over Surface of Water	Sun and Shelter	10	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division, April
Spreads over Surface of Water	Sun and Shelter	30–40	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division, April
Spreads over Surface of Water	Sun and Shelter	30–40	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division, April
Spreads over Surface of Water	Sun and Shelter	30–40	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division, April
Spreads over Surface of Water	Sun and Shelter	20	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division, April
Spreads over Surface of Water	Sun and Shelter	20	Slow-moving	April–June, in Weighted Basket	Seed, ¼ inch deep in Spring; Division, April
Leaves Float on Surface	Sun or Shade	6–12	Slow-moving	March	Division of Roots, March
Erect	Sun	Water Margin	Still	March	Division of Roots, March
Spreads over Surface of Water	Sun and Shelter	2–12	Still	April	Division of Roots, April
Spreads over Surface of Water	Sun	2–12	Still or Slow-moving	March	Division, March
Spreading	Sun	Bog—12	Still	March	Division, March
Tufted	Sun	6–12	Still	March, in Weighted Basket	Seed, ¼ inch deep under Water, April; Division, March
Tufted	Sun	6	Still	March, in Weighted Basket	Seed, ¼ inch deep under Water, April; Division, March
Tufted	Sun	6–12	Still	March, in Weighted Basket	Seed, ¼ inch deep under Water, April; Division, March
Floating	Sun	6–15	Still	March	Division, March
Tufted	Sun	Bog—12	Still	March or Oct.	Division, March or October

increase is by division of tubers, as named varieties are not likely to come true from seeds.

CHAPTER XI

THE BOG OR MARSH GARDEN

A POND is not an essential feature of the bog garden, although its presence is to be desired, for the overflow can be used to feed the marsh. It is essential, however, that the soil of the marsh garden shall be kept in a moist, swampy state through the whole year. The site of the bog garden must, naturally, be low-lying and where the surface drainage will naturally collect. If the subsoil is of sticky clay, a mere trickle of water will keep the ground in a sufficiently moist condition. Should the subsoil be light and well drained, a certain amount of excavation will be necessary before the bog garden can be made.

Constructing the Bog Garden

Dig out about two feet of the top soil and introduce a little clay to form a basis, over this stretch a five-inch bed of rubble or large stones, and then a layer of coarse soil. Now fill the hollow, almost to the level of the surrounding land, with a compost of half loam and half leaf-mould or peat. Unless a natural flow of water is available, an artificial trickle, just sufficient to keep the bog swampy, must be introduced. Because bog plants should never suffer from drought, the marsh garden should be kept quite moist, but on the other hand must not become stagnant, and it is for this reason that slight bottom drainage is introduced. The bog should never be more than two feet in depth; its extent, of course, will depend on the space available and upon taste. Paths of rough stones or bricks should be made through the bog, and over these should be placed flat stepping-stones, in order to make every part of the bog accessible. If these paths are made at varying heights, they may be used to divide the bog into shelving beds, the higher and better-drained of which will accommodate plants not requiring overmuch moisture, while in the lower-lying sites can be grown the real moisture-lovers.

Selecting the Plants

As will be seen from our list, which shows a few good marsh plants, there is no scarcity in this direction. Almost any moisture-loving plant may be used, so may all the subjects that are usually to be found at the margins of streams and ponds, even some of those which at times have six or more inches of water over their crowns ; in fact, all plants growing freely in shallow water may also be grown in the bog garden. Be careful not to overcrowd the plants, rather group together three to five plants of the same kind, leave a space, and again plant a clump of subjects of different colour, type, and height. This irregularity and variety will please the eye, which would tend to become surfeited by a mass of the same colour, size, and form. The actual marsh plants selected will depend upon the layout and size of the garden ; the natural surroundings must also be very carefully considered. If the area is restricted, greater variety and beauty can be obtained by the use of small-growing species ; while among extensive surroundings full rein may be given to the freer-growing plants, many of which are invaluable as a background where space permits. It is always necessary, however, to bear in mind the size to which the plants will grow in from two to three years' time, and to arrange them accordingly.

Only a sound knowledge of the habits and rate of growth of the plants introduced and a clear visualization of the picture one is endeavouring to produce can ensure success in this exceedingly difficult matter of planting for future effect.

PLANTS FOR THE BOG GARDEN

NOTE.—For Fuller Cultural Details, *see* Chapter XII, *Alphabetical List of Plants for the Rock, Wall, Paved, Water, and Marsh Gardens*, p. 143.

Name	Common Name	Height in Inches	Colour	Time of Flowering
Acorus calamus .	Sweet Flag	30	Yellow	July and Aug.
Acorus japonicus (and var. fol. variegatus)	Sweet Flag	30	Leaves striped with Red and White	July and Aug.
Anagallis tenella	Bog Pimpernel	3–4	Pink	July
Arundinaria (several vars.)	Bamboos	24–200	—	—
Arundo donax .	Great Reed	100	Bluish-green Foliage	—
Astilbe (various)	Goat's Beard	20–50	White, Yellow, Purple, Rose, or Crimson	May to Sept.
Bambusa Fortunei aurea	Bamboo	20–30	Golden Variegated Leaves	—
Caltha palustris fl. pl.	Marsh Marigold	12	Double Rich Yellow	May to July
Caltha polypetala	Giant Kingcup	20	Golden-yellow	May to July
Cardamine pratensis fl. pl.	Lady's Smock or Cuckoo Flower	12	Lilac	May to July
Cortaderia argentea	Pampas-grass	72	Cream or Pink	Autumn
Cypripedium spectabile	Lady's Slipper Orchid	20	Pink and White	June and July
Dodecatheon meadia	American Cowslip	12	Purple, Rose, and White	May and June
Epilobium (various)	Willow Herb	6–70	Crimson, Rose, or White	June to Sept.
Fritillaria Meleagris (various)	Snakeshead	10	Purple-rose and White	April
Funkia (various)	Plantain Lily	18–24	Lilac, with Ornamental Foliage	July–Sept.
Gentiana pneumonanthe	Windflower	5–10	Dark Blue	June–August
Geum rivale . .	Water Avens	10	Crimson Pink	May to Sept.
Gunnera manicata	Prickly Rhubarb	80–100	Reddish Flowers. Foliage Plant	August
Gunnera scabra .	Prickly Rhubarb	60	Small Reddish Flowers. Foliage Plant	August
Helonias bullata	Stud-flower	15	Crimson-purple	April to May
Hemerocallis aurantiaca	Day Lily	36	Apricot Orange	June–Sept.
Hemerocallis Dumortierii	Day Lily	15	Yellow and Red-brown	May–August
Hemerocallis fulva	Day Lily	36	Tawny Yellow	June and July
Heracleum villosum	Cow Parsnip	60–100	White	June–August
Iris aurea . .	Yellow Iris	48	Golden-yellow	June
Iris cuprea . .	Iris	20	Red-bronze	June–July
Iris Delavayi .	Chinese Iris	50	Violet	July–Sept.
Iris fœtidissima .	Stinking Gladwyn	30	Bluish-lilac	Summer

Name	Common Name	Height in Inches	Colour	Time of Flowering
Iris Kæmpferi	Japanese Iris	18–30	Various	July–Sept.
Iris lævigata	Japanese Iris	30	Purple and Yellow	July–Sept.
Iris Monnieri	Yellow Iris	36–48	Yellow and White	June–July
Iris Monspur	Iris	50	Light Blue, Lavender, or Violet	July and Aug.
Iris ochroleuca	Golden-banded Iris	48	Yellow and White	June–July
Iris orientalis	Eastern Iris	30–40	Blue	May–June
Iris pseudacorus and var. variegatus	Yellow Iris or Water Lily	30	Yellow	May–July
Iris sibirica	Siberian Iris	30	Magenta Blue, White, Yellow	June
Leucojum æstivum	Summer Snowdrop	15	White with Green Spots	May
Lilium chalcedonicum	Lily	40	Scarlet	July–August
Lilium giganteum	Giant Himalayan Lily	130	White, shaded with Purple	August
Lilium Martagon	Martagon Lily	30	Purple and Black	July
Lilium monadelphium	Lily	50	Yellow	July
Lilium pardalinum	Panther Lily	70	Orange Crimson	July
Lilium superbum	American Swamp Lily	80	Orange Red, spotted Brown	July
Linnæa borealis	Twin-flower	3	White and Pink	June and July
Lysimachia ciliata	Yellow Loosestrife	30	Yellow	July and Aug.
Lysimachia clethroides	Loosestrife	30	White	July–Sept.
Lysimachia nummularia aurea	Creeping Jenny	4	Yellow Flowers, Golden Leaves	June–Sept.
Lythrum salicaria roseum	Purple Loosestrife	40	Rose	July–Sept.
Lythrum salicaria superbum	Purple Loosestrife	40	Purple	July–Sept.
Mimulus cardinalis	Monkey Flower	24	Scarlet	June and July
Mimulus cupreus Brilliant	Monkey Flower	12	Orange	June–August
Mimulus luteus	Monkey Musk	10	Yellow, spotted Brown	July and Aug.
Mimulus radicans	Monkey Flower	Creeper	White and Violet	May–August
Miscanthus japonicus var. zebrina	Zebra-striped Rush	40	Purple	June–Sept.
Orchis foliosa	Madeira Orchis	10–20	Purple	May–June
Osmunda regalis	Royal Fern	10–100	Green Foliage	—
Parnassia palustris	Grass of Parnassus	5–10	White	May–August
Petasites fragrans	Winter Heliotrope	10	White	Dec. to Feb.
Petasites japonicus giganteus	Japanese Heliotrope	50–60	White	Dec. to Feb.
Phlox paniculata	Phlox	40	Various	July–Oct.

Name	Common Name	Height in Inches	Colour	Time of Flowering
Phormium tenax	New Zealand Flax	60	Greenish-white	July–Sept.
Pinguicula vulgaris	Bog Violet	4–6	Purple-violet	April and May
Podophyllum Emodi	May Apple	12	White	May
Podophyllum peltatum	American May Apple	12	White	May
Polygonatum multiflorum	Solomon's Seal	30	White	May and June
Polygonum sachalinense	Knot-grass	100	White	Late Summer
Pratia angulata .	—	2	White	May–August
Primula Beesiana	Primula	20	Magenta	May
Primula Bulleyana	Primula	12–15	Orange	April–May
Primula japonica	Japanese Primrose	12–14	Magenta, Pink, or White	May–June
Primula Juliæ .	Primula	4	Magenta	April
Primula rosea grandiflora	Primula	10	Rose-carmine	March–May
Primula sikkimensis	Himalayan Primrose	20	Sulphur Yellow	May–June
Primula vulgaris	Primrose	9	Yellow	April
Ranunculus aconitifolius	Maids of France	24–30	White	May–June
Rheum officinale	Rhubarb	100	Whitish-yellow	July–August
Rodgersia æsculifolia	Rodger's Bronze Lead	40	Pink	June and July
Sarracenia purpurea	Huntsman's Horn	10	Purple	June
Saxifraga Hirculus	Rockfoil	5	Yellow	July–Sept.
Saxifraga peltata	Giant Californian Saxifrage	30	Pale Pink	May–June
Saxifraga umbrosa	London Pride	10	Pale Pink, White	May and June
Scirpus lacustris .	Great Bulrush	65	Brown	Summer
Scirpus lacustris Tabernæmontani zebrinus	Porcupine Rush	36	Brown	Summer
Senecio Clivorum	—	40–60	Yellow	July and August
Sibthorpia europæa	Money-wort	2	Yellow	July
Solidago (various)	Golden Rod	50–100	Yellow	August–Oct.
Spiræa aruncus .	Goat's Beard	40–50	White	June and July
Spiræa palmata .	Meadow Sweet	24–48	Rose-crimson and White	July and August
Thalictrum (various)	Meadow Rue	6–60	Purple, Yellow, and White	June–Sept.
Trillium (various)	American Wood Lily	6–18	Purple, Red, and White	May–July
Trollius (various)	Globe Flower	10–40	Yellow	May–July
Typha latifolia .	Reed Mace	70	Brown	Late Summer
Typha stenophylla	Reed Mace	30–40	Purple-brown	Late Summer
Vinca major . .	Periwinkle	20	Blue purple	June–Sept.
Vinca minor . .	Periwinkle	9	Blue-purple	June–Sept.

NOTE.—*See also* list of *Hardy Ferns*, p. 76, and *Moisture-loving Shrubs and Trees*, p. 68.

CHAPTER XII

ALPHABETICAL LIST OF PLANTS FOR THE ROCK, WALL, PAVED, WATER, AND BOG GARDENS

Showing the Detailed and Individual Culture, also the Best Species and Varieties

NOTE.—The words in parentheses following the species and varieties indicate first the colour of the flowers, then the time of blooming, and lastly the average height in inches to which the plants may be expected to grow.

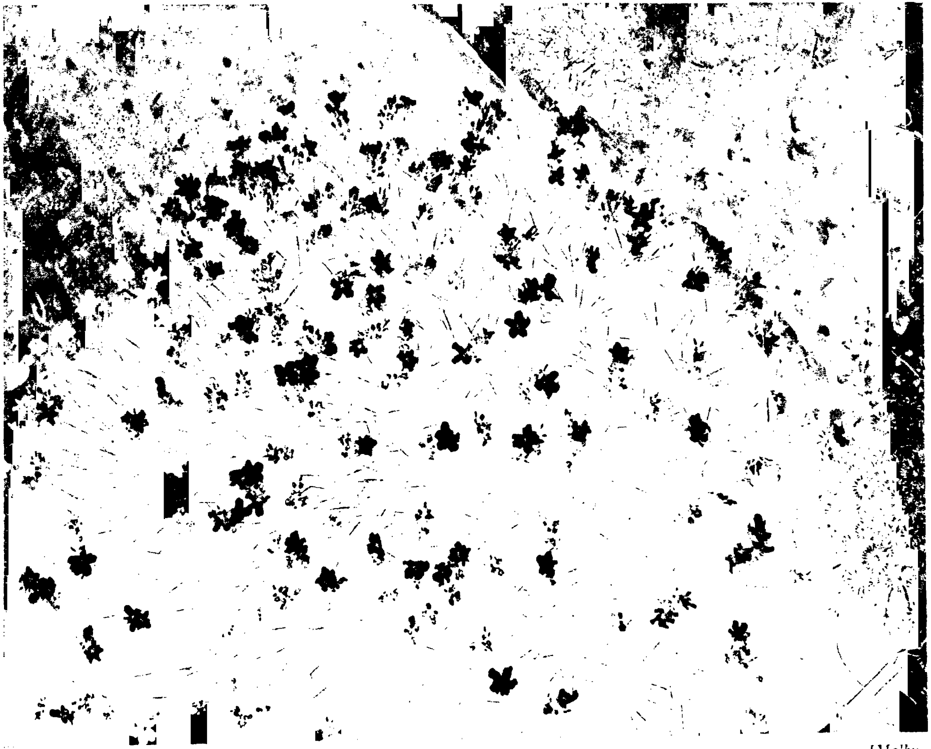
Abelia.—These are hardy and half-hardy evergreen and deciduous shrubs, which, in mild, sunny, sheltered positions, may be grown out of doors. *A. chinensis* (Rock Abelia), with pink flowers grouped in a star-like calyx hung from a long, delicate stem in August and September and growing to a height of 30 inches, is a pretty shrub for the rock garden. *Culture*.—Take cuttings in October and strike in a frame or layer in August. Plant out in March or October in well-drained peaty loam and leaf-mould. Trim to keep in shape only, cut off dead blooms and thin old wood after flowering.

Abies (Fir).—Handsome evergreen coniferous trees, which thrive in open positions in good loam. *A. nobilis* (American Silver Fir) and *A. pectinata* (Silver Fir) are both useful species for planting in the bog or marsh garden, while *A. excelsa inverta* (low-growing species) is particularly useful for the rock garden. *Culture*.—Plant in March or October. No pruning is required. To propagate, sow seed in the open in March or April.

Acæna (New Zealand Burr).—A genus of trailing plants, the dwarf-growing kinds of which are delightful for carpeting in the rock garden and in the wall garden. They do well in sun or shade in ordinary light sandy soil, and must be kept in check, or they are prone to spread and smother other subjects. The flowers are small and of little value, and it is for the reddish-brown spines that form on the dead flower-heads that the plants are chiefly prized. The bronze fern-like foliage is also very pleasing in the autumn when there is little else in bloom. *A. sanguisorbæ,* with its pretty grey-green foliage in summer, is a useful little trailer for the wall garden. *Culture.*—Sow under glass in March, take cuttings in August, or propagate by means of division in April. Plant out in spring or early autumn. These plants do not require protection in winter. *Species.—A. adscendens* (Purple, June–Aug., 6 in.) ; *A. Buchanani* (Yellowish-red, Summer, 2–3 in.) ; *A. microphylla* (Bright Red, June–Aug., 3 in.).

Acantholimon (Prickly Thrift).—Useful little rock plants with grass-like evergreen foliage and of tufted habit. The supporting stems bear the most beautiful statice-like flowers. These plants like a warm, dry, sunny position, and gritty, well-drained loam. They are valuable alike in the rock or wall garden, and are best propagated by means of cuttings with a " heel " in July, or by layering, and, in the case of *A. glumaceum,* by division of roots. *Species.—A. androsaceum* (White) ; *A. glumaceum* (Pale Pink) ; *A. venustum* (Pink). All flower from July to August, and grow from 5 to 6 inches in height. The last-named species likes a position on the moraine, and protection from excessive moisture in winter by means of a sheet of glass.

Acer (Maple).—Hardy deciduous trees for sunny, sheltered, but open, positions facing south or west with well-drained ordinary soil. They are very decorative plants in early spring when their leaves appear in the most exquisite of tints. *A. rubrum* (Red Maple) may be grown with



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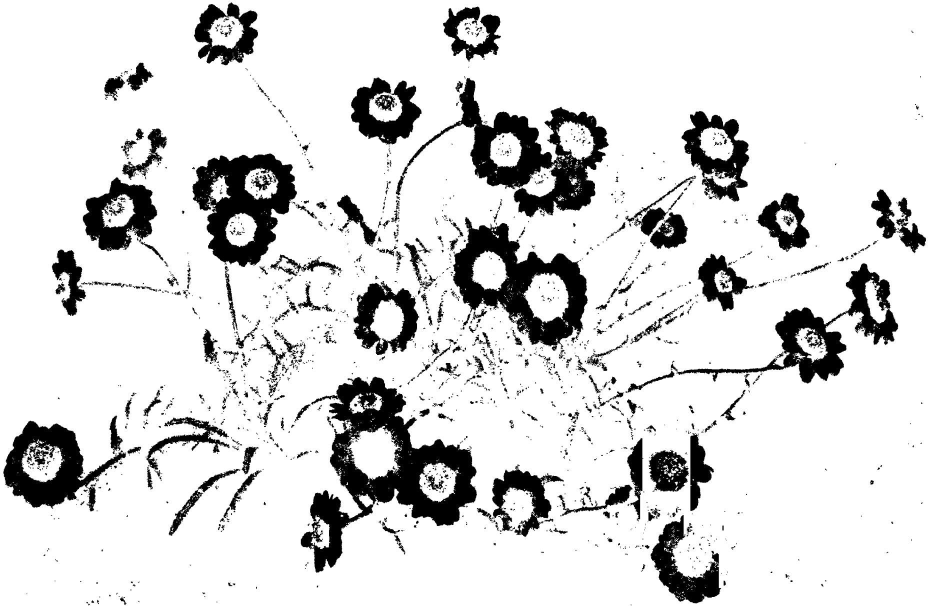


advantage in the bog or marsh garden, where its beautiful foliage of the deepest red may be shown to perfection. *Culture.*—Plant in October. No pruning is required. Propagate by means of budding in the open in August.

Achillea (Milfoil or Yarrow).—This genus includes a number of silvery-leaved, dwarf-growing hardy perennials, which are invaluable for crevices and ledges in the rock garden. They need a sunny situation and a light, dry, rather poor soil. *A. tomentosa* is a delightful subject for the paved and wall gardens, carrying beautiful heads of flowers of the deepest yellow on stems some 6 inches high springing from carpets of bright grey foliage. *Culture.*—Sow seed under glass in March, or propagate by means of division in the spring or autumn. Plant out in position for flowering in October or April. Cover with glass in winter. *Species.*—*A. ageratifolia* [also known as *Anthemis aizoon*] (White and Yellow, June–Sept., 6 in.); *A. argentea* (White, May–June, 3–4 in.); *A. Kellereri* (White, June–Aug., 12 in.); *A. moschata* (Yellow, June–July, 3–6 in.); *A. tomentosa* (Yellow, June–Aug., 6–9 in.); *A. umbellata* (White, July, 2–4 in.).

Aconite.—*See* Eranthis.

Acorus (Sweet Flag, Sweet Sedge, and Myrtle Grass).—A genus of hardy perennials of Iris-like nature, and having leathery leaves from 6 to 30 inches high. The flowers are borne in July and August. They are splendid subjects for the marsh or water garden. *Culture.*—Propagate by means of division in March, and plant out in sunny, marshy situations or in shallow water. *Species.*—*A. Calamus* (Yellow, 30 in.); *A. japonicus* (Leaves striped with Red and White, 30 in.).

Adiantum (Maidenhair Fern).—*A. pedatum* is a hardy species that will thrive in a shady, sheltered position in the rock garden in a compost of peaty loam, leaf-mould, and sand (no lime). *Culture.*—Propagate by means of spores sown under glass in July, or by division in April. Do not pull the roots apart, but cut them with a sharp knife. Plant out in April. *See also* Ferns.

Adonis (Pheasant's Eye).—A genus of most delightful rock plants, annuals and perennials, thriving in partial shade in a mixture of loam, peat, and leaf-mould. The flowers are in shape like those of the buttercup and the laciniated foliage is very striking. *A. amurensis* does not like excessive damp in winter, and needs protecting by means of a sheet of glass. It is also suitable for cultivation in the Alpine House, *see* p. 40. *Culture.*—The annuals may be raised from seed in the usual manner. Perennials—Sow seed under glass in March, or propagate by means of division in September. Plant out in spring or early autumn. *Species.*—(*Annuals*)—*A. æstivalis* (Crimson, May–June, 12 in.); *A. autumnalis* (Blood Red, June–Aug., 12 in.); (*Perennials*)—*A. amurensis* (Bright Yellow, Feb.–April, 12 in.); *A. vernalis* (Yellow, March–April, 10 in.).

Æthionema (Burnt Candytuft).—A genus of dwarf-growing shrubby perennials that are excellent subjects for growing on the moraine or on ledges in the rock garden. They thrive in the sun in gritty or sandy loam, forming in spring small bushes of waxy little leaves and carrying heads of pink and white flowers. *A. grandiflorum* is also useful in the wall garden. *Culture.*—Sow under glass in March or take cuttings in July. Trim in all straggly shoots after flowering. *Species.*—*A. cordifolium* (Rose, June–July, 6 in.); *A. grandiflorum* (Rose, May–July, 12 in.); *A. iberidifolium* (White, May–July, 12 in.); *A. Kotschyi* (Pink, May, 2–4 in.); *A. Thomasianum* (Rosy-lilac, May–June, 3–5 in.); *A. Warley Rose* (Carmine-rose, May, 9 in.).

Ageratum (Floss Flower).—A delightful little half-hardy annual sitting close to the ground and covered all through the summer with dense masses of blue and white flossy flowers. All varieties make excellent subjects for the rock garden. *Culture.*—Sow seed thinly in light soil late in April or in May, in a warm, sunny situation, or under glass in deep boxes of half loam and half leaf-mould and sand in February. Prick off as soon as possible. Harden off in May, and plant out about 12 inches apart the first week in June, the smaller varieties being planted closer together. Cuttings may also be struck in a frame in August. *Species.*—*A. mexicanum* (Blue and White, May–Sept., 6–8 in.). *Named Varieties.*—*Heavenly Blue* (Slate Blue); *Imperial Dwarf* (Deep Blue); *Lavender Band* (Lavender); *Little Dorrit* (Pale Blue); *Snowflake* (White).

Ajuga (Bugle).—Although *Ajuga reptans* (the Common Bugle) is hardly worthy of notice, this genus includes several pretty little rock plants with attractive foliage. The best of these is probably *A. reptans metallica crispa*, which has crinkled, dark green leaves with a metallic lustre, and blue flowers. These little plants thrive in almost any situation and in ordinary, gritty soil, and are usually propagated by means of division in March or April. Other attractive varieties are *A. r. purpurea* with purple leaves, and *A. r. variegata* with green and white leaves.

Alchemilla (Lady's Mantle).—*Alchemilla alpina* is a low-growing little rock plant of tufted habit with silvery green, strawberry-like foliage and carries tiny greenish flowers in summer. It is useful for carpeting in the paved or rock garden, and likes a sunny, open position and a well-drained, gritty, ordinary soil with a little lime in it. Propagate by means of division in spring or autumn. *A. pentaphylla*, with tiny white flowers, is also deserving of a place in the rock garden.

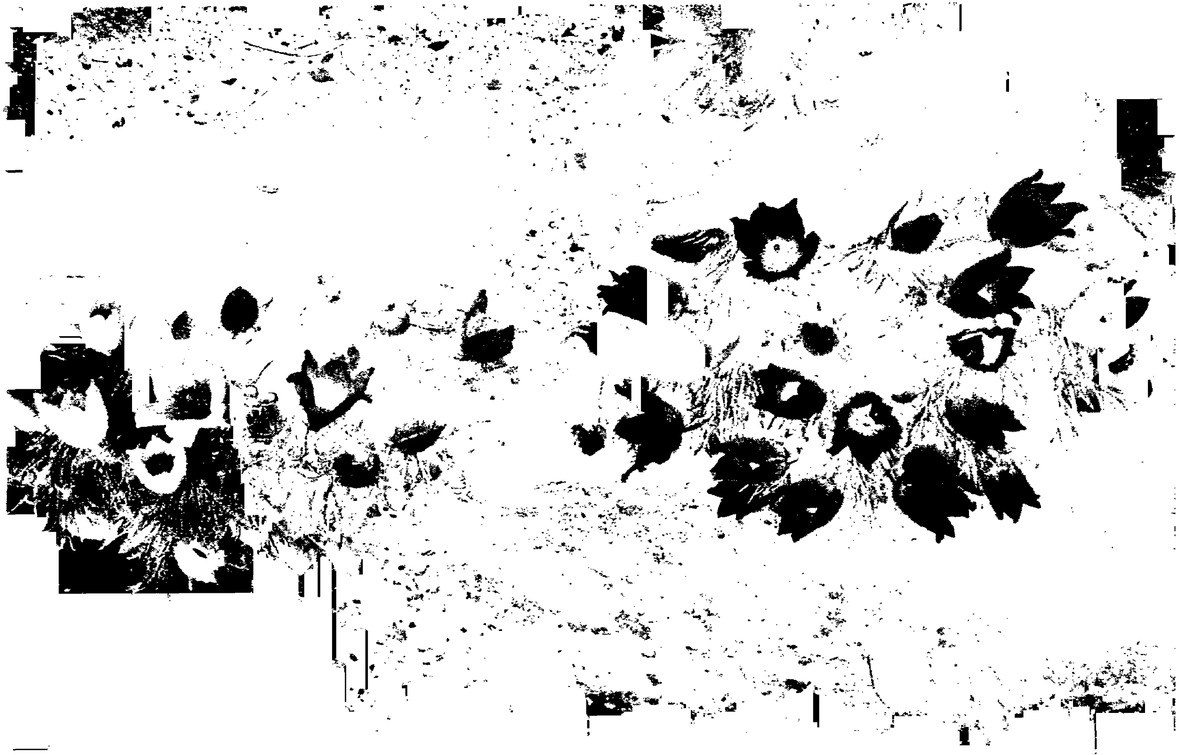
Alisma plantago (Water Plantain).—Hardy perennials of tufted habit, which are useful for bog or water margin in ordinary soil. They grow about 30 inches high, and the rosy-white flowers are borne from June to August. *Culture.*—Sow in March in peat, or propagate by means of division in April, and plant in sunny positions with from 1 to 12 inches of slow-moving water above the crowns.

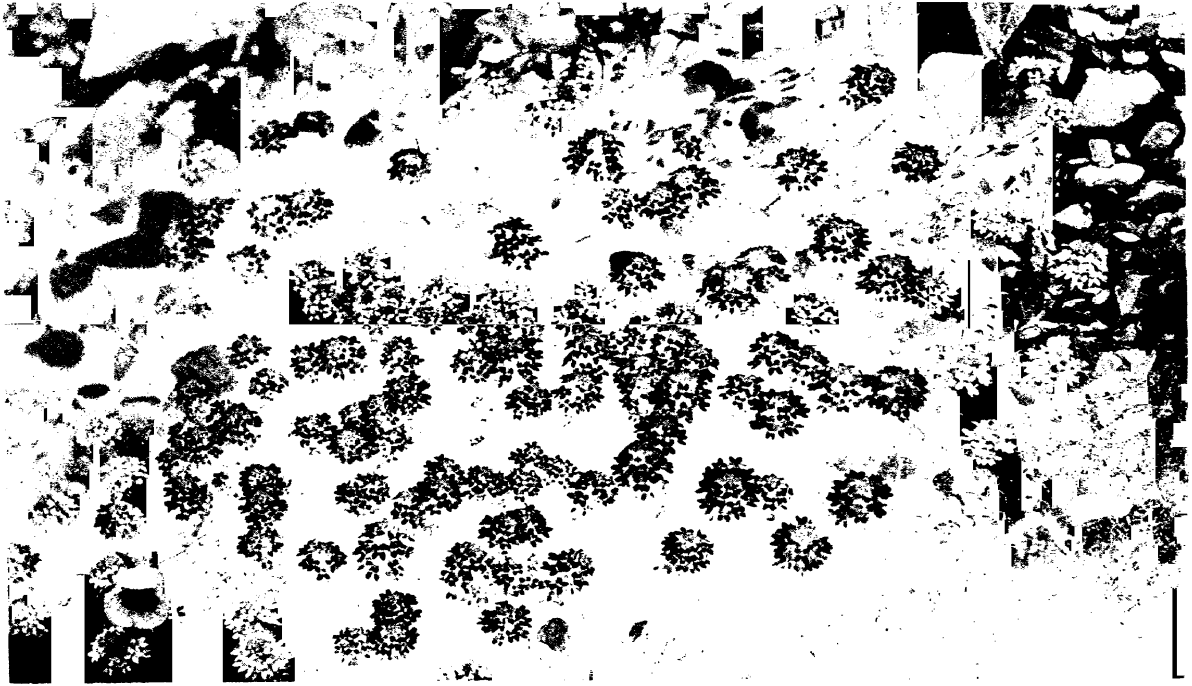
Allium.—Attractive hardy bulbous plants of the onion family, with long, greyish, daffodil-like leaves from the base of which appear slender stalks bearing heads of blue, yellow, rose, and white flowers from May to July. They make interesting subjects for the rock garden, and like a sunny position and a well-drained light loam to which a little sand and leaf-mould have been added. *Culture.*—Plant in September or October, 3 inches deep and 4 inches apart. Lift from the ground when overcrowded and replant immediately. Propagation is by means of seed in a frame in gentle heat in March, or by offsets in October. *Species.*—*A. moly.* [the Lily Leek] (Yellow); *A. narcissiflorum* (Lilac-rose); *A. neapolitanum* (White); *A. pedemontanum* (Purple); *A. roseum* (Lilac-rose); *A. Beesianum* (Blue).

Alnus (Alder).—A deciduous tree, which grows well in sunny, open positions and in a moist, swampy soil. *A. glutinosa imperialis* (Cut-leaved Alder) and *A. laciniata* (Drooping Alder) are fascinating species for growing in the bog or water garden. *Culture.*—Plant in October. No pruning is necessary. May be propagated by means of seed or by grafting.

Aloysia nodiflora.—*See* Lippia.

Alyssum (Rock Madwort).—These are some of the most valuable dwarf annuals and perennials for sunny places in the rock garden. They love a sandy soil; and will not thrive in damp, heavy ground. The annual species, which are quite hardy, bloom nearly the whole summer through, and are excellent for edging or carpeting. The perennials are amongst the earliest and most attractive and showy of spring flowers and constitute some of the best rock or wall garden subjects. *A. montanum* is also useful in the paved garden or moraine, its woody stems seeming to cling to the stones among which they are growing. From a dense little tuft of grey foliage it sends up loose heads of yellow flowers in early summer. *A. Legascæ* (syn. *Ptilotrichum purpureum*), 2 to 3 inches high, with its lilac-pink flowers in May and June, is useful for the miniature rock garden.





Æthionema Thomasianum.

Culture.—(*Hardy Annuals*)—Sow seed thinly ¼-inch deep in the open from March to May; and when fit to handle thin out to 6 inches apart. (*Perennials*)—Sow seed under glass in March, take cuttings 4 to 5 inches long in April or September and strike in sandy soil under glass, or divide the roots in spring or autumn. Plant out in flowering positions in spring or autumn. They require no protection in winter. *Species.*—(*Annuals*)—*A. maritinum* [Sweet Alyssum] (White, May–July, 4–6 in.). (*Perennials*)—*A. citrinum* (Sulphur-yellow, April–May, 5–7 in.); *A. montanum* (Yellow, May–June, 3 in.); *A. saxatile compactum* (Yellow, May, 6–10 in.); *A. spinosum* (White, May, 6 in.).

Amelanchier (June Berry or Service Berry).—Hardy deciduous trees and shrubs that thrive in sunny, sheltered positions with moderately light and moist soil. They make suitable subjects for the large bog or marsh garden. *Culture.*—Plant in October or November. Do not prune, but cut out dead wood, and thin when necessary after flowering. Propagate by means of seed in March, by grafting on the thorn in March, by cuttings struck in the open in October, or by layering. *Species.*—*A. canadensis*; *A. alnifolia.* Both bear white flowers from April to May, and grow to 50 feet in height.

Anagallis (Pimpernel).—Delightful little half-hardy annuals of soft green foliage that send out from the axil of each leaf on long hair-like stems the most dainty star-like flowers of red, pink, or blue. They should be grown in warm, sunny positions in the rock garden. *A. tenella* (Bog Pimpernel) thrives on a moist bank in the bog or marsh garden. *Culture.*—Sow seed thinly in the open in April, or in March under glass (*Temp.* 50° F.). Prick out 4 inches apart into boxes, harden off, and plant out 12 inches apart during May. *Species.*—*A. Brewerii* (Red, Summer, 5 in.); *A. grandiflora* (Various, Summer, 6 in.); *A. tenella* (Pink, July, 3–4 in.).

Anchusa (Alkanet).—*A. myosotidiflora*, with pale blue flowers from July to August, and which grows to a height of 12 inches, is a delightful perennial for the rock garden, forming dense clumps of dark green borage-like leaves from the midst of which emerge slender greyish stems branching here and there and carrying dainty little porcelain-blue forget-me-not flowers. It likes a sunny position, but does not require very rich soil. *Culture.*—Sow seed in the open in April, propagate by means of division in spring or autumn, or take root cuttings in July. Plant out in October or November, and protect the roots in winter. In cold, heavy soil it is better to plant out in the following March.

Andromeda (Marsh or Wild Rosemary).—Hardy, evergreen, heath-like shrubs, which grow best in the sun and in boggy or moist, peaty soil. Their roots should never be quite dry, but they will grow in well-drained, fibrous loam, if ample moisture is provided and no lime is present. The flowers, borne in sprays at the end of the branches, are exactly like those of the Lily of the Valley. *Culture.*—Plant in October. Propagate by means of ripe seed sown in pans or boxes under glass in October, or layer in September. *Species.*—*A. floribunda* (White, Spring, 30 in.); *A. polifolia* (Rose-white, May and June, 20 in.); *A. tetragona* (White, Spring, 12 in.).

Androsace (Rock Jasmine).—These most beautiful, low-growing, and typically alpine plants are divided into two main groups: those of rather rampant growth that require a sunny site, ample drainage, and a gritty, sandy loam; and the high alpine or rock-loving class, which needs a dry, hot, rocky crevice with a deep root-run, or a sunny position in shingle. In many cases they are rather like very woolly, thin-leaved house leeks. They must have ample moisture in the growing season, but it must not come in contact with the minute, furry cushions of foliage. To the second section belong such plants as: *A. alpina* (syn. *glacialis*), *A. ciliata*, *A. cylindrica*, *A. helvetica*, *A. imbricata*, *A. pubescens*, and *A. pyrenaica.* These are extremely difficult to grow in this country, and are of very little value for the garden. Most androsaces have silky or woolly leaves and these need a covering of glass in winter to keep out excessive wet. The masses of starry, primula-like flowers are pink or white and are borne in early summer on short erect stems some 3 to 6 inches high. *Culture.*—Sow seed under glass in March, take cuttings in September and strike in sandy soil under glass, or propagate by means of division in April. Plant out in the open in spring or early autumn. Androsaces may also be increased by layering in July.

ANDROSACES (EASILY GROWN)

Name	Colour of Flowers	Height in Inches	Soil and Site	Remarks
A. arachnoidea	Pinkish-White, Yellow Eye	3	Well-drained Sandy Loam. Limestone Ledge	Forms silvery, hairy rosettes. One of the best
A. carnea .	Bright Rose and White	3	Cool, Sandy, Stony Loam. Moraine or Rocky Ledge	Small, bright, glossy green tufts. Needs no glass protection in winter.
A. Chumbyi .	Brilliant Carmine	4	Well-drained Gritty Loam. Rocky Ledge or Moraine	Silvery rosettes of woolly foliage. Needs glass covering in winter
A. foliosa .	Rose-lilac	6	Well-drained Sandy Loam and Leaf-mould. Rocky Ledge	Long, grey-green tufts. Coloured foliage in autumn. Spreads rapidly. Needs glass protection in winter
A. lanuginosa	Rose-pink	4	Well-drained Loam. Rocky Ledge or Moraine	Trailing stems form silvery-grey carpet over rocks. Needs protection in winter
A. obtusifolia	Pink	2–4	Good Gritty Soil	Keep fairly dry and do not water overhead. Position Sunny
A. sarmentosa	Rose, White Eye on Red Stems	4	Well-drained Gritty Loam Rocky Ledge	Forms large silvery-green rosettes of woolly foliage. Needs glass covering in winter
A. villosa .	Rosy-white, Yellow Eye	3	Well-drained Sandy and Stony Loam. Rocky Ledge	Foliage forms tufts of small, woolly rosettes. Needs glass protection in winter

Anemone (Windflower and Pasque Flower).—Anemones of both kinds, hardy fibrous-rooted herbaceous perennials and the tuberous-rooted, thrive best in an open position in semi-shade and in a moist, light, rich medium loam, but generally succeed in any which is well drained, well dug and manured.

The dwarf-growing kinds are most excellent for carpeting under and amongst small shrubs, and for filling odd corners in the rock garden, while such species as *A. blanda* (Greek Anemone), *A. hepatica*, and *A. hortensis* may also be grown with advantage in pans in the Alpine House, *see* p. 40.

The star-like, bell-shaped flowers, appearing through a clump of woolly Globe-flower-like leaves, are delicate and extremely lovely. A few anemones, at least, should be in every rock garden. The list (p. 153) shows some of the more suitable and lovely kinds. *Culture.*—(*Tuberous*)—Plant from October to the end of March. Set the tubers about 3 inches deep and 5 inches apart. The roots are best left undisturbed, but may be taken up as soon as the leaves have died down for removal or for drying-off and replanting in the autumn. A change of position is recommended at intervals of two or three years. These anemones may be propagated by means of division of dry rhizomes from September to March. (*Fibrous-rooted Herbaceous Perennials*)—Sow in April in the reserve garden, thinly in drills a foot apart and ¾-inch deep. Shade from the sun until the seed is up. Thin-out the seedlings to 3 inches apart, and leave them in the reserve garden until the leaves have died down after flowering the following spring, then lift, store, and replant in their flowering positions 8 inches apart early in September.

Autumn-flowering, in types that should only flower in spring, may generally be prevented by excluding light and air by means of heavy top-dressings of well-rotted manure during the summer months.

ANEMONES FOR THE ROCK GARDEN

These are all tuberous, except those indicated with an *, which are fibrous. *A. alpina* and *A. pulsatilla* like lime in their soil; *A. nemorosa* and *A. sulphurea* dislike lime; and *A. pratensis* and *A. pulsatilla* like a rather dry site.

Name	Colour of Flowers	Flowering Period	Height in Ins.	Remarks
**A. alpina*	Creamy-white	May–July	12–18	Star-like Blooms. Fine Ferny Carrot-like Foliage
A. apennina	Blue or White	March–May	9	Naturalize in Grass
A. blanda	Blue, Pink, or White	March–April	6	Plant in Broad Patches on Sunny, Sheltered Slope
A. coronaria (Poppy Anemone)	Various	May–June	12	Plant in Drifts in Sunny Position
A. fulgens	Scarlet	May–June	12	Warm, Sunny Places in the Rock Garden
**A. hepatica*	Blue, Red, Pink, or White	March–May	6	Plant in Drifts in Damp, Shady Places
**A. hortensis* (syn. *A. stellata*)	Lilac	Early Summer	9	Warm, Sunny Places in the Rock Garden
A. narcissiflora	Very Pale Rose	May–June	18	Plant in Drifts in a Sunny Position with a Moist Root-run
A. nemorosa (Wood Anemone)	Lavender-pink, Blue, or White	April	6	Plant in Large Drifts or Naturalize in Grass
A. pratensis	Purple, Blue, Pink, or White	April–May	10	Plant in Semi-shady Position
A. pulsatilla (Pasque Flower)	Purple or White	March–May	9	Large-flowered and Fern-like Foliage
A. sulphurea	Pale Yellow	May–June	12–18	Plant in Clumps in a Sunny Position with Moist Root-run
A. sylvestris	Cream	May	12	Of very Spreading Growth

Antennaria.—Useful little dwarf-growing rock plants of creeping habit that form silvery tufts of foliage and bear in summer masses of tiny pink or white flowers. They spread rapidly in the sun in sandy, gritty loam, and are extremely useful for carpeting, etc., in the paved and rock gardens. These little flowers are best propagated by means of division of roots in spring or autumn, and require no protection in winter. *Species.*—*A. tomentosa* (White) and *A. dioica* (Rose).

Anthemis (Chamomile).—Hardy perennials with scented, finely-cut, silvery foliage, the dwarf-growing species of which should be grown in sandy loam on sunny ledges in the rock garden. *Culture.*—Sow seed in heat in March or in the open in April, or propagate by means of division in April or October. *Species.*—*A. aizoon* [also known as *Achillea ageratifolia*] (White, June–Sept., 6 in.); *A. cupaniana* (White, June–Sept., 6 in.); *A. montana* (White, June–Aug., 12 in.); *A. pedemontana* (White, June, 6 in.).

Anthericum (St. Bernard's Lily).—These are very useful plants of the Lily family, growing well in any warm, dry corner. *Culture.*—Sow seeds in spring, and prick off into pans. Plant out in autumn. *Species.*—*A. Liliago* (White, June–July, 30 in.); *A. ramosum* (White, June, 12–15 in.).

Anthyllis (Kidney Vetch and Ladies' Fingers).—Pretty little shrubby rock plants with silvery, pea-like flowers on 10-inch stems in June and July. They are of tufted habit, and have pointed, downy foliage. A sunny position and a warm, gritty loam suits them best. *Culture.*—Sow seed under glass in March, take cuttings in March and strike in light, sandy soil, or propagate by division in March or September. Plant out in flowering position in spring or early autumn. *Species.*—*A. montana* (Purple-pink); *A. Vulneraria* (Yellow).

Antirrhinum (Snapdragon).—Only one or two species of this popular plant are suitable for the rock or wall garden. These are of dwarf or trailing habit, with broad, hairy, and light-grey leaves, and love sunny positions and a dry, well-drained, sandy, and gritty loam. They must be protected from excessive wet by means of glass (*see* p. 25) in winter, and are usually raised from seed sown under glass in March. *Species.*—*A. Asarina* (White and Yellow, May–Aug., 4 in.); *A. glutinosum* (Whitish-Yellow, May–Aug., 5 in.).

Aponogeton distachyum (Cape Water Hawthorn or Pond Weed).—A useful hardy aquatic plant, which spreads over the surface of the water, and carries masses of small white flowers from May to October. It does equally well in sun or shade in water with an ordinary soil bottom, and is excellent for ponds, fountains, or basins, but must be kept in check or it will soon smother other aquatics growing with it. *Culture.*—Propagate by means of offsets or division in March. Plant in a weighted basket in slow-moving water with from 6 to 30 inches of water above the crowns. If the water is deeper than the stalks, make a mound of soil in the water and plant so that the leaves will reach the top. There is also a variety *A. d. roseum* with pink and white flowers.

Aquilegia (Columbine).—These are hardy herbaceous perennials and biennials, that do best in rather shady, sheltered positions and in moist, cool, well-drained, deep, rich loam and leaf-mould to which a little lime has been added. Their dainty, fairy-like flowers are borne on wiry, slender stems, and the whole plant is altogether graceful. The dwarf kinds should certainly be tried in the rock or wall garden. *Culture.*—The columbines cross-fertilize with one another so profusely that they are very difficult to raise true from seed. If seed is used, it should be sown under glass in March or August, or the plants may be propagated by means of division in April or September. Plant out in spring or early autumn in rich, gritty loam in a semi-shaded position. They require no protection in winter. *Species.*—*A. alpina* (Violet-blue, May and June, 10 in.); *A. cærulea* (Pale Blue, May–July, 10 in.); *A. canadensis nana* (Orange, May–July, 15 in.); *A. glandulosa* (Lilac-blue and White, May–July, 12–18 in.); *A. pyrenaica* (Blue and White, May–July, 15 in.).

Arabis (Rock Cress).—These are the most frequently seen of all the hardy perennial rock plants. They like a sunny position and ordinary well-drained soil or sandy loam. Arabis increases rapidly and thus should not be planted in close proximity to more choice plants, as it will be likely soon to smother them, and for the same reason should be trimmed back after flowering. Some varieties have rather attractive variegated leaves (*A. albida variegata* and *A. lucida variegata*), and are chiefly used in the front of mixed borders, in the rock garden, and for carpeting. *A. albida fl. pl.* and *A. androsacea* are showy and useful in the wall garden ; *A. alpina* may also be grown with advantage in the Alpine House, *see* p. 40. *Culture.*—Sow seed under glass in March, take cuttings 3 inches long in August and strike in sandy soil under glass, or propagate by means of division in September. Plant out in flowering position in spring or early autumn. They should be cut well back after flowering.

Arctostaphylos Uva-ursi (Bearberry).—This is a pretty little trailing evergreen shrub, with small, roundish, leathery leaves, and in April and May carries flowers shading from white to rose. It is indigenous to certain moorland and mountainous districts, and if similar conditions are provided, can be grown quite easily from seed. It dislikes lime in the soil. *A. alpina* (The Black Bearberry), with white to red flowers in September, is a delightful little shrub, which rarely grows more than 10 inches high.

Arenaria (Sandwort).—Dwarf hardy perennial creeping plants forming carpets and tufts of compact bright green foliage that in summer is smothered with masses of small white, pink, or reddish flowers. They are useful for carpeting, for the paved garden, and are ideal for the rock garden. These plants like the sun and a moist, sandy, gritty loam. *A. balearica* is also useful for the wall or paved garden, clinging very closely to the ground and smothering the soil with the most minute green leaves from which arise slender stalks bearing little white star-like flowers. *Culture.*—Sow seed under glass as soon as ripe or in March, take cuttings in April and strike in sandy soil under glass, or propagate

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by division in March or September. Plant out in a rather cool spot in the open in sun or shade in spring or early autumn. No protection need be given in winter. They are apt to spread and encroach on other plants, but do little harm and are easily kept in check. *Species.*—*A. balearica* (White, May and June, 3 in.); *A. cæspitosa* (White, June–July, 3 in.); *A. montana grandiflora* (White, May–July, 3 in.); *A. laricifolia* (White, June–July, 3 in.); *A. purpurascens* (Reddish-purple, June and July, 3 in.).

Armeria (Thrift, Sea Pink, Cushion Pink, etc.).—Dwarf and tufted hardy perennials with grass-like evergreen foliage, now mainly seen in the paved and rock garden. The colour of the flowers ranges from a deep pink to white. These little plants like a sunny, open position and a dry, deep, gritty, and strong loam. *Culture.*—Sow seed as soon as ripe under glass or in the open in April, or propagate by means of division in March, and plant out in permanent position. The plants should be divided at least every third year. *Species.*—*A. cæspitosa* (Lilac-pink, June, 4 in.); *A. juncea* (Lilac, June–July, 4 in.); *A. maritima* (Rose, Red, Lilac, White, June–July, 6–12 in.); *A. plantaginea* (Rose, May–July, 18 in.).

Arnebia (Prophet Flower).—Hardy annuals and dwarf-growing perennials, which do best in the sun and in well-drained, sandy loam. *A. echioides*, a perennial, is an attractive little rock plant with clusters of yellow flowers, each spotted with five black dots. *A. cornuta* and *A. Griffithii*, annuals, are other useful dwarf species. *Culture.*—(*Annuals*)—Sow seed in March under glass or in the open in April; (*Perennials*)—Sow seed under glass as soon as ripe or in March, or propagate by means of division in September. These plants, except *A. echioides*, require no protection in winter. *Species.*—*A. cornuta* (Yellow, Black Dot, June–Aug., 15 in.); *A. Griffithii* (Deep Yellow, June–Aug., 10 in.); *A. echioides* (Pale Yellow, Black Dot, May–Aug., 9 in.).

Artemisia (Old Man, Lad's Love, Southernwood, etc.).—This genus comprises hardy herbaceous perennials, also evergreen and deciduous shrubs with fragrant and silvery foliage. They thrive in ordinary soil and in an open position. Several of the dwarf-growing kinds make excellent plants for the rock garden. *Culture.*—Propagate by means of division in October, or increase by cuttings in September. *Species.—A. alpina* (Yellow, July, 10 in.); *A. argentea* (Yellow or White, June–Sept., 20 in.); *A. lanata* (Yellow [Silver Foliage], July–Aug., 4–6 in.); *A. tridentata* (Silvery Foliage).

Arundinaria.—A genus of bamboo, the species of which require a moist climate, a deep, rich loam holding ample leaf-mould, and plenty of protection from north and east winds. Arundinarias are valuable for planting near streams and ponds and in the bog garden. All species, save *A. japonica*, quickly suffer from drought, and it is essential that they shall receive attention in dry weather, if planted where the soil is apt to dry quickly. Of the hardy kinds *A. japonica* (syn. *Bambusa Metake*), growing 10 to 15 feet high, is the most generally grown. *Culture.*—Propagate by means of division in May, and plant out in semi-shade. Cut out all dead wood in April. *See also* Bambusa. Other hardy species are: *A. Falconeri* (20 ft.); *A. nitida* (10 ft.); *A. Simonii* (15 ft.); *A. Veitchii* (15 in.). Variegated species: *A. auricoma* (4 ft.), and the dwarf-growing *A. Fortunei* (20 in.).

Arundo (Great Reed).—A perennial which thrives in semi-shade on slightly swampy banks in light, rich loam, and grows to a height of 10 feet. It is very attractive, but is only suitable to large marsh or water gardens. *Culture.*—Propagate by means of division in May. *Species.—A. donax* (Glaucous Foliage, 10 ft.); *A. donax variegata* (Leaves Striped with White, 10 ft.).

Asarum europæum.—A curious and useful little rock plant growing about 2 inches high and during the spring bearing purplish bell-shaped flowers amidst a mass of dark, heart-shaped, leathery leaves, which almost smother them. *Culture.*—Propagate by means of division from September to March, and plant out in permanent position in a shady spot under shrubs and in moist and rich soil. No protection is necessary in winter. *A. virginicum* is another hardy kind.

Asperula (Woodruff).—Beautiful little dwarf-growing perennials with dense moss-like foliage. They make most attractive subjects for the moraine or for rough slopes in the rock garden, and like a sunny site, and sandy loam with ample grit in it. Protection by means of glass (*see* p. 25) should be afforded during the winter. *A. Gussonii* is also useful for the wall garden, or may be grown in the Alpine House, *see* p. 40. *A. suberosa* dislikes lime in its soil. *Culture.*—Sow seeds under glass as soon as ripe or in April, or propagate by means of division in April. Plant out in permanent position in spring or early autumn. Dress occasionally with granite chips and leaf-mould. *Species.*—*A. azurea setosa* (Light Blue, June–Sept., 4 in.) ; *A. Gussonii* (Rose, May–Aug., 4 in.) ; *A. hirta* (Pink [Star-like Flowers], March–Sept., 3 in.) ; *A. odorata* (White, May–June, 9 in.) ; *A. suberosa* (Pink [Silver Foliage], June and July, 3 in.).

Aspidium (Shield Fern).—A large genus of hardy and greenhouse deciduous and evergreen ferns, including amongst the hardy species: *A. acrostichoides* (Christmas Fern, 18 in.) ; *A. aculeatum and vars.* (Hard Shield Fern, 30 in.) ; *A. angulare and vars.* (Soft Prickly Shield Fern, 30 in.) ; and *A. lonchitis* (Holly Fern, 10 in.). All may be grown in the cool, shady rock garden. *Culture.*—Plant in April in rich sandy loam and leaf-mould. Propagate by means of spores sown under glass in July. *See also* Ferns.

Asplenium (Spleenwort).—A large genus of hardy and greenhouse evergreen ferns. The hardy species, which are excellent for the rock garden, thrive in the shade and in a mixture of peaty loam, leaf-mould, and old mortar rubble. *Culture.*—Plant in April. Propagate by means of division in April, or sow spores under glass in July. *Species.*—*A. adiantum-nigrum* (Black Maidenhair Spleenwort), 6 to 12 inches; and *A. ruta-muraria* (Wall Rue), 2 inches. *See also* Ferns.

Aster (Starwort).—The dwarf kinds, such as *Aster alpinus* (6 inches high, with large white, blue, purple, or pink flowers in July), are very lovely and make excellent subjects for the rock garden. They need the sun and a dry site. *Culture.*—Sow seed under glass as soon as ripe or in March, or propagate by means of division of roots in March or October. Do not allow too many shoots to spring from any one crown, or the flowers will deteriorate. Lift and divide the roots triennially. Slugs, unfortunately, are very partial to these asters, and if the plants are to survive, ceaseless war will have to be waged on them (*see* p. 298).

Astilbe (Goat's Beard).—The astilbe is closely allied to the Spiræa, having the same loose foliage. It needs a cool, deep, and moist loam, either in sun or shade, and is thus a suitable subject for the marsh or bog garden. When grown in the sun, ample water must be afforded in dry weather and a mulch of leaf-mould should be given every November. These plants grow from 2 to 6 feet in height and flower from May to September. *See also* Spiræa. *Culture.*—Propagate by means of division in autumn or spring, and plant out in permanent position, which should be enriched with ample well-decayed cow-manure or hop-manure. Do not lift or divide the roots for three or four years after planting. *Species.*—*A. Arendsii* [hybrids] (Purple, Red, Pink); *A. Davidii* (Rose-purple).

Astragalus (Milk Vetch).—Hardy dwarf-growing plants of the broom genus, some of which make excellent subjects for the rock garden. They thrive in the sun and in deep loam, sand, and mortar rubble. *A. danicus albus* is a pretty little plant for the wall garden. *Culture.*—Sow under glass in the spring or summer, or propagate by division in autumn. *Species.*—*A. alpinus* (Purple, June–Aug., Trailing); *A.*

danicus albus (White, May–July, 5 in.); *A. tragacantha* (Violet-purple, May–July, 20 in.).

Astrantia (Masterwort).—Hardy perennials, which like a shady position and a soil composed of cool, moist loam and leaf-mould. The dwarf-growing kinds are very lovely and exceptionally pleasing for the rock garden. The glossy, deep green foliage is laciniated and the flowers, which are usually whitish or rose, are carried in umbels on slender stems. Propagate by means of root division in spring or autumn. *Species.—A. Biebersteinii* (Rose, May–July, 30 in.); *A. major* (White, tinged Pink, May–July, 18 in.); *A. minor* (Pale Rose, May–July, 6 in.).

Athyrium (Lady Fern).—Hardy deciduous ferns growing from 2 to 4 feet in height and doing best in shady positions and in a mixture of peat, sandy loam, and leaf-mould. They are excellent subjects for the rock garden. *Culture.*—Plant in April. Propagate by means of spores sown under glass in July. *See also* Ferns.

Atriplex hortensis rubra.—This is a hardy annual with ornamental red foliage. It grows to a height of about 4 feet, and makes a most attractive plant for the marsh or bog garden. *Culture.*—Propagate by means of seed sown in the open in April or August, and thin out to 18 inches apart.

Aubrietia (Rock Cress).—Pretty perennial evergreen trailing plants, which in spring provide masses of colour in the paved and rock gardens. They thrive amazingly on the moraine and even on the wall in the sun and in dry, rich, sandy loam and leaf-mould. They are happiest when allowed to ramble over the rocks or down the face of a wall. *Culture.*—Sow seed under glass as soon as ripe or in April, prick out to 3 inches apart, and plant out in flowering position in October. Propagate also by means of division in October or March, or cuttings may be taken in July and struck in sandy soil in a frame. Plant out in permanent position when well rooted. After flowering all straggling shoots should be trimmed well back; if this is not done, the old crowns are liable to die back. *Varieties.—Bridesmaid* (Blush-pink); *Dr. Mules* (Violet-blue); *Fire King* (Crimson); *Lavender*; *Lilac Queen* (Rose Lilac); *Magician* (Purple); *Warbarrow* (Rose). All flower from April to June, and grow from 4 to 6 inches in height.

Auriculas (Alpine) (syn. *Primula Auricula*).—Alpine auriculas are most delightful plants for the rock garden, forming tight little clumps of thick, leathery leaves, which in spring are covered with a white bloom or farine. The flowering period is from March to May, when the plants throw up spikes of primrose-like flowers in all imaginable colours. *Culture.*—Sow in a light, sandy soil in a little heat immediately the seeds are ripe or in March. Prick-off into boxes as soon as four leaves have formed. Harden-off in a shady cold frame at the end of May. Plant out 6 inches apart in September or October in a partially-shaded position facing north, and in well-drained, rather heavy loam and cow-manure. Lift, divide, and re-plant triennially after flowering. *Varieties.—Admiration, Day Dream, Firefly, Majestic, Roxborough, Silver Wood.*

Azalea.—Azaleas are distinguished as *Ghents* (deciduous), *Mollis* or *Japanese* (deciduous), and *Indian* (evergreen). The first two are the most suitable for open-air culture, and some species are very attractive if planted in the bog, marsh, or rock garden; the Indian azaleas are greenhouse plants. A compost of sandy peat and loam, or two-thirds fibrous loam and one-third leaf-mould, is suitable for all species, but they will grow quite well in almost any soil which does not contain lime or chalk. *Culture.*—For outdoor culture, *see* Rhododendrons. *Species.—(Hardy)—A. mollis* (Red, Yellow, etc.); *A. nudiflora* (Pink or White); *A. pontica* (Yellow). All these flower from May to June and grow to a height of from 3 to 6 feet. Named varieties are almost innumerable, and growers' catalogues should be consulted.

Bambusa (Bamboo).—There are three great classes of bamboos, namely, *Arundinaria, Bambusa,* and *Phyllostachys.* Most species do well in the open in the bog or marsh garden, especially if the soil is of a moist, deep, and light loamy nature, and has some peat or leaf-mould in it, but in exposed situations they require some protection. *Culture.*—Propagate by means of division in May, and plant out in a sheltered position on a slightly swampy bank and in partial shade. Cut out dead canes in April, and mulch annually with a good dressing of leaf-mould or well-rotted manure. *Species.*—*(Hardy)*—*B. Fortunei aurea* (2–3 ft.) ; *B. Metake* (15 ft.) ; *B. palmata* (8 ft.) ; *B. pygmæa* (1½ ft.) ; and *B. tessellata* (3 ft.).

Bartonia (Mentzelia Lindleyi).—A pretty little hardy annual, which makes a useful addition to the rock garden. It grows to a height of 15 inches and bears bright yellow flowers from June to October. *Culture.*—Sow seed thinly ¼-inch deep in a warm, sunny position, or in gentle heat, from March to May, or in September. Thin out to from 15 to 18 inches apart when fit to handle.

Bellis (Daisy).—There are many species of this dwarf-growing hardy perennial, all of which may be grown in the rock garden. Among the most beautiful are the *Large Double,* the *Large Quilled,* and the *Hen and Chickens.* All thrive in the sun and in moderately rich soil, and produce masses of flowers in the spring and early summer. They grow from 6 to 12 inches high. *Culture.*—Sow seed in the open in June, or propagate by means of division after flowering. Plant out in permanent position in October. All daisies flower better if the roots are periodically divided. *Species.*—*B. perennis.* *Named Varieties.*—*Alice* (Shell-pink, double) ; *Eliza* (Red) ; *Rob Roy* (Crimson, double) ; *The Bride* (White) ; *Victoria* (Pink and White).

Bellium minutum (syn. *B. rotundifolium*).—Attractive little dwarf-growing daisy-like perennials with flowers that are whitish inside and darkish purple on the outside from

May to September. They are very suitable for the paved or rock garden. These little plants will grow almost anywhere, but thrive in the sun in a mixture of sandy loam and leaf-mould, growing to about 3 inches high. *Culture.*—Sow seed under glass as soon as ripe or in March, or propagate by means of division in April.

Berberis (Barberry).—Beautiful hardy flowering shrubs, evergreen and deciduous, among which are some of the most useful and attractive shrubs in cultivation. The stems are very thorny, and many species bear lovely orange or yellow flowers in spring or early summer, and in autumn carry handsome black, purple, or red fruit. Others have gorgeously tinted foliage in autumn. *Culture.*—Plant from March to April or from October to November in ordinary soil or, better still, sandy loam. When overcrowded thin out old and useless wood after flowering, and shorten long shoots to keep the bushes in shape. Trimming should be delayed until the spring in the case of shrubs grown for autumn foliage. Most species are propagated by means of seeds in the open in October, by half-matured cuttings in a frame in July or August, or by layering in August. *B. stenophylla*, which is a useful species to grow in the marsh or bog garden, must be propagated by cuttings. *B. Wilsonæ*, with its golden-yellow flowers in May, is a small-leaved and dwarf-growing plant, which makes a most useful shrub for the rock garden. The coral-red berries appear in the late autumn and last a long way through the winter. *Species.*—(*Evergreen*)—*B. aquifolium* (Yellow, Feb. and March, 5 ft.); *B. Darwinii nana* (Orange, April–May); *B. stenophylla* (Yellow, April–June, 8–10 ft.) (*Deciduous*)—*B. concinna* (Yellow, Spring, 3 ft.); *B. Thunbergii nana* (Yellow, April–May, 3 ft.); *B. vulgaris*, the Common Barberry (Yellow, May, 4–15 ft.); *B. Wilsonæ* (Yellow, May, 2–4 ft.).

Betula (Birch Tree).—Plant in October or November in a sunny, open, but moist position. *B. alba* (Silver Birch) and *B. pendula* (Weeping Birch) are graceful trees for the bog or water garden. *B. alpestris*, *B. humilis*, *B. nana*, and *B. pumila*, are more or less dwarf-growing, and make attractive shrubs for the rock garden. All species will thrive in a poor, gravelly soil. No pruning is necessary. Propagate by means of seed or by grafting.

Blechnum (Hard Fern).—Hardy and greenhouse evergreen ferns growing from 10 to 30 inches high. The hardy species, which are excellent subjects for the rock garden, thrive in shady positions and in a mixture of sandy loam and leaf-mould with no lime in it. *Culture.*—Plant in April. Propagate by means of spores sown under glass in July. *See also* Ferns.

Bloomeria.—Half-hardy, bulbous-rooted plants, that may be grown in the open in a warm sheltered rock garden. In more exposed places, however, they should be grown indoors. They do well in a sandy soil, growing from 10 to 15 inches high, and flowering in May and June. *Culture.*—Plant in September or October 2 to 3 inches deep and 3 inches apart. Propagate by means of offsets in September. *B. aurea* (Golden-yellow) and *B. Clevelandii* (Yellow) are among the best species.

Borrago (Borage).—*B. laxiflora* is a pretty little hardy annual. It is of trailing habit and is sometimes grown in the rock garden. In summer it carries quaint rosettes of foliage and bell-shaped, violet-blue flowers. Seed should be sown in the open in March.

Brachycome (Swan River Daisy).—A beautiful summer-flowering, dwarf-growing half-hardy annual, covered during the greater portion of the summer with a profusion of pretty cineraria-like flowers. It grows about 9 inches high, and makes a very effective subject in the rock garden. *Culture.*—Sow seed thinly in light, rich soil in April in the open, or in March or April in gentle heat. Thin out, or plant out 9 inches apart in a sunny position about the end of May. This plant does best when sown where it is to flower. *Varieties.*—*White Star, Blue Star, Red Star.*

Brodiæa (Californian or Missouri Hyacinth).—Beautiful hardy and half-hardy bulbous plants with hyacinth-like foliage, amidst which the cup-shaped flowers of various colours are borne on stems but very little taller than the leaves. It is the dwarf-growing species that interest us here, and these may be grown in well-drained, deep, sandy soil mixed with leaf-mould, in sunny sites in the rock garden. *Culture.*—Plant in October, 3 inches deep and 5 inches apart. Protect with ashes during winter, and lift the bulbs from the soil every fourth year only. Propagate by means of offsets in October. *Species.*—*B. grandiflora* (Violet-blue, June and July, 15 in.) ; *B. ixioides* (Yellow, Summer, 6 in.) ; *B. uniflora* (White or Blue, April–May, 6 in.).

Bruckenthalia spiculifolia.—These little dwarf-growing evergreen shrubs, which are closely allied to the heath family, rarely exceed 7 or 8 inches in height, and make excellent subjects for the rock garden. They prefer a light, peaty soil, and the pretty pale-rose, bell-shaped flowers are borne in June and July.

Bryanthus (Phyllothamnus).—A delightful hardy evergreen shrub of trailing habit and with heath-like foliage. It thrives in sunny or partially-shaded positions and in moist but well-drained, sandy peat, but will grow quite well in ordinary loamy soil, provided it is lime-free. Being of a dwarf habit, it is very valuable for the rock garden. *Culture.*—Plant in October or March ; no pruning is required. Propagation is by means of cuttings in a frame in October, or by layering at that time. *B. erectus* (12 in.), which in April and May carries purple-pink, pitcher-shaped flowers, is a good species. *B. empetriformis* (12 in.) has flowers of a similar colour and is also well worth growing.

Bulbocodium (Spring Meadow Saffron).—A pretty little hardy bulb with crocus-like blooms, that appear before the leaves. It makes a worthy addition to the rock garden, and likes a well-drained, sandy soil and a sunny position. *Culture.*—Plant in August, 3 inches deep and 4 inches apart.

Lift from the soil every fourth year, and propagate by means of offsets in August. *B. vernum* (Purple-red, Jan.–March, 5 in.) is the best species.

Butomus umbellatus (Flowering Rush or Lily Grass).—A hardy aquatic perennial of tufted habit, which likes a warm, sunny position in a bog or on a muddy bank, or in sheltered still water, with from an inch to a foot of water above the crowns. It grows to some 2½ feet in height and carries pink flowers from June to August. Propagate by means of division in March.

Cacti.—Cacti cannot be said to form a genus, but rather a class including a number of genera which possess similar characteristics. They are curious and interesting perennials, many of the species producing magnificent flowers of the most striking and brilliant colours. Hardy cacti make most fascinating subjects for the rock or wall garden. They should be planted in spring in a well-drained, sunny, sheltered site and in light loam with a mixture of brick rubble, sand, and gravel. *Cereus*, *Echinocactus*, and *Mamillaria*, and those whose hairy or downy stems are likely to hold moisture, should be covered with glass in winter. Propagate by means of cuttings (partially dried) in summer, by grafting in March, or by offsets. *Species.*—(*Hardy*)—*Cereus Engelmanni* (Purple, June, 18 in.); *Mamillaria setispina* (Pink, Summer, 9 in.); *Opuntia pulchella* (Purple, Summer, 10 in.).

Calamintha alpina (Calamint)—A most useful and hardy aromatic plant for the rock and paved gardens. It forms a thick carpet of foliage, and all through the summer carries sprays of violet flowers. This plant should be grown in a sunny site and in gritty loam. Propagate by means of seeds under glass in March, or by division in March or September. *C. grandiflora* is a taller species (12 in.) with purple-red flowers in July and August.

Calandrinia (Rock Purslane or Portulaca).—Beautiful dwarf-growing annual and perennial plants, that thrive in the sun and in sandy loam. *C. umbellata* (perennial), a trailing species with crimson flowers carried on slender stems, is invaluable for the rock garden, and for dry, hot banks. *Culture.*—Sow seed under glass in March. Thin out as early as possible, harden off, and plant out in May. Propagate perennials by means of division in spring or autumn, and plant out in permanent position. No protection is necessary in winter. *Species.*—(*Annual*)—*C. discolor* (Lilac, 12–18 in.); *C. grandiflora* (Rose, 18 in.); *C. speciosa* (Purple, 9 in.). (*Perennial*)—*C. umbellata* (Crimson, 9 in.). All flower from July to September.

Calceolaria (Slipper Flower).—There are two distinct kinds of calceolaria, the *Herbaceous*, raised and reared under glass for flowering in May and June, and the *Shrubby*, chiefly grown for bedding out. Some of the dwarf-growing species of the latter, such as *C. polyrrhiza* (10 in.), with soft yellow flowers spotted brown and borne in July, make excellent subjects for a damp position in the rock garden. *C. plantaginea* (10 in.), with canary yellow flowers from June to September, is another useful species. *C. violacea* (12 in.), with light bluish-violet flowers in summer, is a very choice but somewhat delicate species. These calceolarias love partial shade and a moist, fibrous loam mixed with leaf-mould or peat and sand. *Culture.*—Take cuttings of vigorous young basal shoots in September and strike under glass, or in a warm north border, and cover with a hand-glass. If the weather turns frosty, throw some covering over the hand-glass. About the middle of February the cuttings must have their growing points pinched back. A fortnight later they may either be potted up or kept as cool as possible, 3 to 4 inches apart in the pit, and should be finally transferred to the rock garden towards the end of May or early in June. Division of the roots may be preferred, and this should be done in spring or autumn. Seed may also be sown under glass in March (*Temp.* 50°–60° F.). Transplant the seedlings into boxes as soon as they can be handled, and next pot up singly into 3- to 4-inch pots. Transfer to a cold frame in May, and before the plants become pot-bound, harden-off gradually, and plant out early in June.

Calla palustris (Bog Arum).—Hardy aquatic plants, which spread over the surface of shallow, still water. They like a sunny position and a firm soil at the margin of ponds. The white flowers are borne from June to August. *Culture.*—Plant in March with not more than 12 inches of water above the crowns. Propagate by means of division of roots in March.

Callirhoë (Poppy Mallow).—*C. involucrata,* a trailing perennial species with beautiful purple-red flowers in July and August, is worthy of a place in any rock garden. It likes a sunny site and well-drained ordinary soil, and is best propagated after flowering by means of cuttings in September. Seed may also be sown in spring or autumn.

Calluna (Ling-Heather).—A hardy evergreen shrub thriving in full sun and in peaty, non-calcareous soil. *Culture.*—Plant in October; trimming off dead flower-heads in April. To propagate, take cuttings in summer and strike in peaty soil in a frame, or layer in summer. *See also* Erica. *Species.*—*C. Alportii* (Crimson-pink, July–Sept., 15 in.); *C. aurea* (Golden Foliage, July–Sept., 12 in.); *C. Foxii* (Pink, July–Sept., 5 in.); *C. glauca* (Pale-pink, July–Sept., 18 in.); *C. Serlei* (White [Double], July–Sept., 12 in.).

Calochortus (Butterfly Tulip, Star Tulip, or Mariposa Lily).—Half-hardy bulbous plants, that should be planted in full sun and in sandy, well-drained leaf-mould. *Culture.*—Plant in late October, 3 inches deep and 3 inches apart, in a sunny corner of the rock garden. Cover with straw or fibre in winter, and lift the bulbs when the leaves die down. Propagate by offsets in November. *Species.*—*C. Howellii* (White, July–Aug., 18 in.); *C. pulchellus* (Yellow-orange, July–Aug., 12 in.); *C. venustus and vars.* (Yellow and Red, July and Aug., 15 in.).

Caltha (Marsh Marigold).—A useful hardy perennial for the water-side or for a moist position in the bog or marsh garden. *Culture.*—Propagate by means of division of roots in March or July, and plant out on a moist bank or at the water's edge in rich soil and in full sun or partial shade. *Species.*—*C. palustris fl. pl.* (Rich Yellow [Double], May–July, 12 in.); *C. purpurascens* (Deep Yellow, Flushed Maroon, May–July, 15 in.); *C. polypetala*, The Giant Kingcup (Golden, May–July, 20 in.).

Camassia (Quamash).—Hardy bulbous plants, which grow well in moist, but sunny positions and in a mixture of loam, leaf-mould, and well-rotted manure. *Culture.*—Plant in October, 4 to 5 inches deep and 10 inches apart; lift from the soil every fourth year. Propagate by means of offsets in October, or by seed under glass in March. *Species.*—*C. esculenta vars.* (Purple-blue, Blue, and Silvery White, May and June, 20–30 in.); *C. Fraseri* (Pale Lavender-blue, May and June, 20 in.).

Campanula (Bellflower).—A comprehensive and deservedly popular genus, including annuals, biennials, and perennials, and providing a great variety of plants for the greenhouse, border, and rock garden. The species themselves are numerous, but as they intermarry freely, the hybrids are bewildering in their names and almost overpowering in number. The alpine species are most delightful little plants, and quite indispensable in the rock garden. The flowers are mostly blue, purple, or white in colour, and vary considerably in form. Some are tall and erect; others are prostrate. In shape the flowers are mostly bell-shaped and drooping, but in many cases they are star-like or cup-shaped and are carried erect with their centres facing upwards. Generally the flowers are borne on single stems, but some species carry several flowers on a stalk. These alpine campanulas rarely exceed 6 inches in height, and nearly all of them love an open position in sun or partial shade, doing best in rocky crevices, on walls, on the chipstrewn scree of a moraine, or in the chinks between the stones in the paved garden. They should be given a compost of well-drained, light, sandy loam with ample grit and leaf-mould. Most of these plants are lime-haters. Generally speaking, they are very easy of cultivation, but a few need special conditions. In the list below we give a selection of species that are representative, well worth having, and at the same time easy to grow. There are many other species, as, for example, *C. barbata*, *C. excisa*, and *C. Zoysii*, that are difficult. Such kinds we have omitted. *C. pulla* does not like lime in its soil and is essentially a plant for the moraine, but it will grow in gritty leaf-mould in a chink or crevice. *C. garganica hirsuta* must be protected by means of glass (*see* p. 25) in winter. *C. pulla*, as well as such species as *C. alpina* and *C. pusilla*, are also excellent subjects for cultivation in the Alpine House (*see* p. 40). There are, in addition, the taller campanulas, as *C. grandiflora*, *C. latifolia*, and *C. persicifolia*, which are rather large for the small rock garden, but which may be grown in out-of-the-way corners and on the outskirts. *Culture.*—Most species are easily raised from seed, but many, unfortunately, do not as a rule come true to type, and are, therefore, better propagated by means of division of roots. Sow seed in gentle heat as soon as ripe, or in March, or propagate by means of division in spring or autumn.

CAMPANULAS FOR THE ROCK GARDEN

* Indicates species which like a mixture of gritty, peaty loam, and leaf-mould.
† Indicates those requiring a sunny position.

Name	Colour of Flowers	Flowering Period	Height in Inches	Remarks
**C. alpina* .	Steel-blue	July–Aug.	4	Large, pendant bells on short stems rising from tufts of greyish, hairy foliage. Very beautiful, but very apt to die off

Name	Colour of Flowers	Flowering Period	Height in Inches	Remarks
C. cæspitosa .	Blue	June–July	5	Easily grown. Excellent for the Wall or Paved Garden
C. carpatica (*vars.*)	Purple, Blue, or White	May–Sept.	6–12	Spreads rapidly. Should be grown
C. cenisia . .	Blue	June	2–3	Excellent for the Miniature Rock Garden
C. fragilis .	Blue	Summer	5	Easily grown. Excellent for the Wall or Paved Garden
C. garganica .	Blue, Mauve, or White	June–Sept.	Trailing	Large, star-shaped flowers. Splendid plant for rock ledges, Wall or Paved Garden, or for the Moraine.
†*C. garganica hirsuta*	Pale Blue	July–Sept.	4	A good plant for a wall. Needs glass covering in winter
†*C. Hostii* .	Blue	July	10	Excellent grower and very sturdy. Flowers on wiry, erect stems
C. Loyeii . .	Pale Blue	Aug.–Sept.	2–3	Excellent for the Miniature Rock Garden
C. muralis (syn. *Portenschlagiana*)	Purple-blue	June–Aug.	4	Large mats of glossy foliage covered with bell-shaped flowers. Easily grown almost anywhere. Good for Wall or Paved Garden, or for rock ledge
**C. pulla* .	Deep Violet	June–Sept.	3	Large, pendant bell-shaped flowers on single stems. A lovely kind
C. pulloides .	Deep Violet, Blue, or Mauve	June–Aug.	5	Showy, large-flowered and easily grown. Excellent for Paved Garden or Moraine
C. pusilla pumila	Pale or Deep Blue, or White	June–Aug.	3	Small, pendant bells in masses. Tufted habit. Grows almost anywhere and rampages over the rocks. Excellent for Carpeting, for the Paved or Wall Garden, or for rocky crevices. Also for the Moraine
C. rotundifolia (Harebell)	Blue or White	Summer	10	Suitable to almost any situation
C. Stansfieldii	Violet	June and July	4–5	A very beautiful plant
**C. Waldsteiniana*	Bright Blue-mauve, White Eye	June–July	3–6	Star-like flowers on erect, wiry stems. One of the best and easiest. Grow on a wall, or in the Paved Garden, or on the Moraine
C. G. F. Wilson	Deep Violet-blue, Whitish Eye	July–Aug.	4	Flowers semi-pendant and bell-shaped. Vigorous and spreads rapidly. Suitable for almost any situation.

Cardamine (Lady's Smock, Bitter Cress, or Cuckoo Flower).—Hardy perennials growing from 6 inches to 2 feet in height and flowering from May to July. They do best in sun or shade and in marshy land in the bog garden. *C. pratensis fl. pl.*, which grows about 12 inches high and carries pretty lilac-coloured flowers, is the species most suitable for cultivation. There are some annual species also, but these are of no practical interest in the rock garden. *Culture.*—Propagate by means of division in March, and plant out in permanent position.

Carlina acaulis.—Pretty little dwarf-growing rosette-shaped plants for the rock garden. The flowers, which appear in summer, are like miniature thistles, nestling closely to the rosette. The plants will thrive almost anywhere, and are easily raised by means of seed sown in spring or autumn.

Cassinia.—Beautiful evergreen shrubs, very branching by nature, which like a sunny position and an ordinary well-drained soil. They grow from 3 to 6 feet high, and flower from July to September. *C. fulvida*, which grows about 4 feet high and carries pretty creamy-white flowers, is a good species that may be grown with advantage in the rock garden. *Culture.*—Plant from October to November; thin out the branches when overcrowded. To propagate, strike cuttings in a frame in August.

Cassiope tetragona.—Beautiful dwarf evergreen shrubs with white flowers hanging like small bells from erect, heath-like stems in April and May. They rarely exceed 6 inches in height, and make excellent additions to the rock garden. *Culture.*—Propagate by means of layering in July or by cuttings in August placed under a bell-jar in a compost of sand and peat. Plant out in April. A cool, moist, semi-shaded site is desirable, also sandy loam and leaf-mould. *C. fastigiata* and *C. Mertensiana* are useful subjects for the miniature rock garden. They are lime-haters.

Cedar (Cedrus).—Hardy evergreen trees, dwarf-growing varieties of which, such as *C. atlantica aurea*, *C. a. fasti-*

giata, C. a. glauca, C. a. pendula, C. Deodara, var. pendula, and *C. Libani brevifolia,* are useful in the rock garden. Plant in September in a sunny position and in a well-drained, gravelly, chalky, or sandy soil. To propagate, sow seed in March or April.

Celmisia.—A genus of tufted, dwarf-growing plants with long hairy leaves and pretty white daisy-like flowers in summer. The hardy species make delightful subjects for the rock garden. They like a dry, warm position in full sun or semi-shade and a gritty, sandy soil. *Culture.*—Sow seed under glass as soon as ripe or in March. Protect with glass in winter. *Species.*—*C. coriacea* ; *C. holoserica,* easiest grown ; *C. grandiflora* ; *C. Lindsayi* ; and *C. spectabilis.* These all grow from 12 to 18 inches high.

Centranthus (Valerian).—A bright and free-flowering hardy perennial, which reproduces very rapidly and has, therefore, to be kept in check. It likes a sunny position and a dry, hot, and limy soil, and is useful for cultivation in the rock garden or on walls. *Culture.*—Sow seed in the open in April, or propagate by means of division in November or March and plant out in permanent position. *Species.*—*C. angustifolius* (Crimson, May–July, 24 in.) ; *C. ruber* (Crimson, Rose, June–Aug., 24–36 in.) ; *C. albus* (White, June–Aug., 24 in.).

Cerastium (Mouse-ear, Chick-weed, Jerusalem Star, Snow in Summer).—A genus of dwarf-growing and spreading hardy perennials of tufted growth that are extremely useful for carpeting or for crevices in the rock, wall, or paved gardens. *Culture.*—Sow seed under glass as soon as ripe or in April, take cuttings 3 inches long in June and strike in sandy soil under glass, or propagate by means of division in March. Plant out in spring or early autumn in a sunny position and in poor, sandy or gritty loam. After flowering, all straggling growths should be cut back, or less vigorous neighbours will soon be suffocated. No protection is necessary in winter. *Species.*—*C. Biebersteinii* (White

[Silver Foliage], May–June, 6 in.); *C. tomentosum* (White [Silver Foliage], June–Aug., 6 in.).

Ceratostigma (Leadwort).—Low-growing rock plants with thin, wiry stems carrying rather glutinous bright green leaves and breaking out into heads of brilliant cobalt blue flowers in autumn. They grow best in the sun in gritty loam, and are very suitable for rock ledges, crevices, and walls. *Culture.*—Sow seed under glass, or propagate by means of division in March or September and plant out in permanent position. No protection is necessary in winter. *C. plumbaginoides* (Cobalt Blue, July–Sept., 9 in.), sometimes named *Plumbago Larpentæ*, is the best known.

Charieis (Cape Aster).—A pretty little free-flowering hardy annual, which when well-grown is very effective in the rock garden. It grows some 6 inches high and flowers from June to September, thriving in any good garden soil. *Culture.*—Sow seed thinly ¼-inch deep from March to May, and thin out to 6 inches apart when fit to handle. *C. heterophylla* (Violet, Crimson, Blue, or White, 6 in.) is the most commonly grown species.

Cheiranthus. *See* Wallflower.

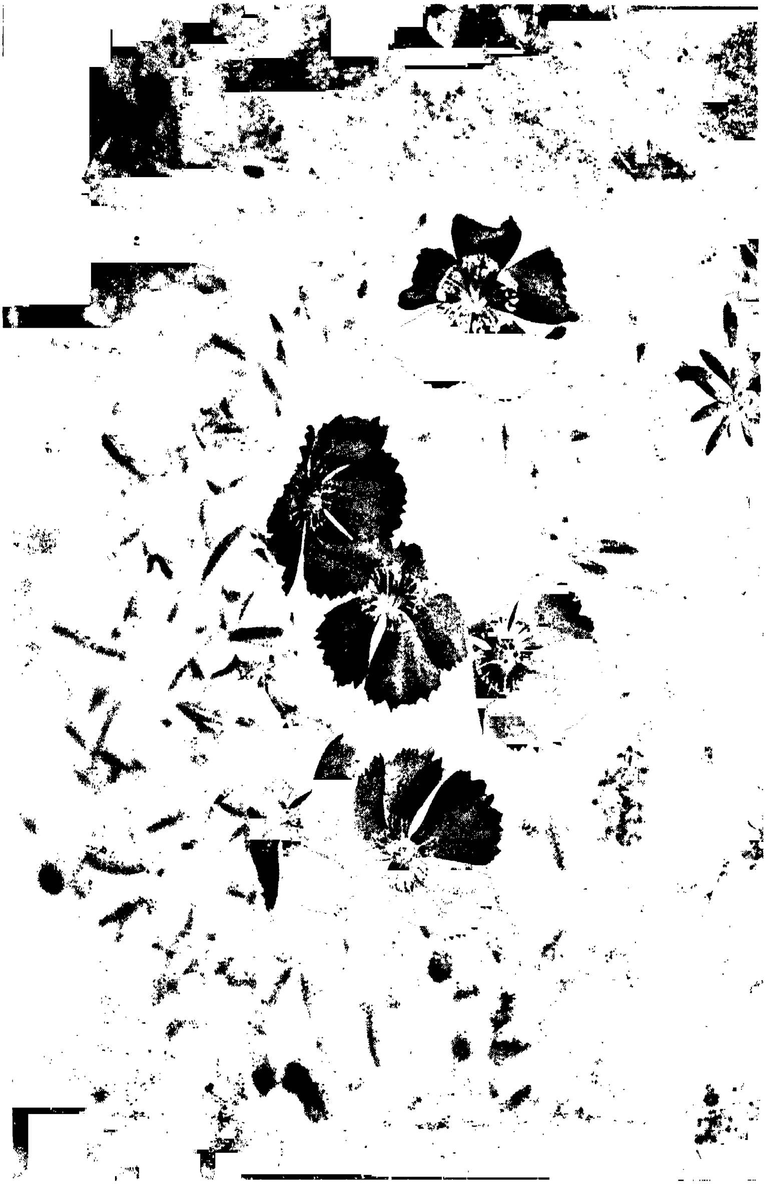
Chionanthus (Fringe Tree).—A hardy deciduous shrub, which is well worthy of a place in the bog or marsh garden. It likes a partially shaded and sheltered position and a well-drained, moist loam, and in June and July bears white flowers. *Culture.*—Plant from October to November, or in February and March, and trim to shape only after flowering, as the flowers are borne on the wood made in the previous year. Plants grown as bushes merely require slight trimming to keep them in shape. Propagate by means of layering in September, or strike cuttings of matured shoots with a "heel" in the open during that month.

Chionodoxa (Glory of the Snow).—This bulbous plant requires similar treatment to that accorded to bulbs generally, and likes a shady position and sandy loam, but is very easy to grow and thrives almost anywhere. It makes an extremely valuable subject for the rock garden. In March and April it bears some 5 or 6 star-shaped blooms on stems from 6 to 9 inches high. The most popular species is *C. luciliæ grandiflora*. *Culture.*—Plant in October 2½ inches deep and from 3 to 4 inches apart. Propagate by offsets in October, or raise from seed. The best blooms must never be expected if the bulbs are constantly disturbed. *See also* Bulbs, p. 55. *Species.*—*C. gigantea* (Soft Mauve or Blue, and White, March, 9 in.); *C. luciliæ grandiflora* (Lavender-blue [White Centre], March–April, 9 in.); *C. sardensis* (Deep Blue, March–April, 7 in.).

Chrysanthemum (Perennial Ox-Eye Daisy).—Most of these are more suited to the mixed border than to the rock garden, but *C. alpinum*, which only grows about 5 inches high and in June and July carries white flowers, and *C. arcticum*, 8 inches high with white flowers tinged with lilac in July and August, are both nice plants for the rock garden. *Culture.*—Sow seed in the open in April, or propagate by means of cuttings or division of roots in March. They like a fairly sunny position and a somewhat moist, gritty soil.

Chrysogonum virginianum (Golden Knee).—A showy herbaceous perennial, somewhat like a sunflower. The star-shaped, golden-yellow flowers are borne all through the summer. It grows to a height of about 10 inches, and will be quite happy in a shady spot in the rock garden. This plant likes a rich, loamy soil and needs ample water in dry weather. *Culture.*—Seed may be sown in the usual way in April, but it is better to propagate by means of division of roots in March or September.

Cistus (Rock Rose, Helianthemum).—These plants, now generally included in the genus Helianthemum, are beautiful evergreen shrubs, mostly hardy in warm, sheltered sites. They grow from 2 to 5 feet in height, and bear very pretty flowers. These are usually white, rose, or purple and are spotted with a different colour, generally purple or yellow, at the base of each petal. Each flower, unfortunately, lasts



only one day, but a succession of blooms keeps the bushes gay from June to August. They are commonly known as Rock Roses from the fact that the flowers resemble a large single rose. These plants make admirable subjects for the rock garden, and love the sun, doing well in dry, well-drained, sandy loam or in ordinary soil to which ample lime-rubble has been added. *Culture.*—Do not prune, merely keep the shrubs in shape by "stopping" in March and by removing dead blooms. Propagate by means of layering in August, sow seed in April, or take cuttings of half-matured wood in August and strike in a shaded frame. Grow in pots till ready for planting out. *Species.*—*C. algarvensis* (Yellow and Crimson, June–July, 24 in.); *C. crispus* (Rose-purple, June–July, 24 in.); *C. lusitanicus* [syn. *Loreti*] (White [Blotched Carmine], June–July, 36 in.); *C. purpureus* (Purple-red [Blotched Crimson], June–July, 36–48 in.); and *C. villosus* (Purple-crimson, June–July, 24–36 in.).

Claytonia (Spring Beauty).—This genus includes a number of dwarf-growing hardy perennial plants, that may successfully be introduced into the rock or wild garden. They grow from 4 to 12 inches high, bear white, pink, or red blossoms in the spring, and thrive in the sun or semi-shade and in almost any non-calcareous soil, though a mixture of half loam and half leaf-mould is to be preferred. *Culture.*—Sow seed in March where the plants are to flower, or propagate by means of division in spring or late summer. *Species.*—*C. asarifolia* (Blush-pink); *C. caroliniana* (Pink); *C. rosea* (Rose); and *C. virginica* (White).

Codonopsis.—These are beautiful little perennials with twining stems and a strong odour. They may with advantage be grown in some wild place in the rock garden. Their pretty creamy-white to pale blue flowers appear in summer, and hang like bells from a twining mass of greyish stems and leaves some 3 to 4 feet in height. They thrive in the sun and in ordinary garden loam. *Culture.*—Seed may be sown as soon as ripe or in March under glass, or, perhaps, the best method of propagation is by means of division of roots in spring or autumn. *C. ovata* is well worth growing.

Colchicum (Meadow Saffron or Autumn Crocus).—Hardy bulbous-rooted plants with flowers very like those of the crocus, only much larger and standing erect. They look like wine-glasses of the most exquisite colouring. As with the bulbocodium, the leaves do not appear until the flowers have faded. The plants are *poisonous* and should not be planted where children are likely to get at them. They grow from 4 to 10 inches high, bloom in September and October, and are really delightful plants for the rock garden, in view of the late season of their bloom. *Culture.*—Plant in full sun in July or August, 5 inches deep and 6 inches apart in moist, cool loam. Lift from the ground (triennially) in August to increase them. *Species.*—*C. autumnale* (Lilac-rose, 6 in.); *C. cilicicum* (Pink, 5 in.); *C. montanum* (Lilac or White, 4 in.); *C. speciosum* (Crimson, with Purple or White Eye, 10 in.).

Conandron Ramondioides.—Beautiful little dwarf-growing semi-hardy plants of tufted habit, that will make a pretty show in a sheltered site in the rock garden. The violet-blue flowers, in shape like those of the potato plant, are borne in summer on short stems rising from the glossy, bright green begonia-like foliage. The plants will thrive best in semi-shade and in a well-drained, sandy and peaty loam. *Culture.*—Seed may be sown under glass as soon as ripe, or in March. Protect with glass in winter.

Cornus (Cornel, Dogwood, Cornelian Cherry).—These are free-flowering deciduous shrubs and trees, with beautiful green, silvery-grey, or golden leaves, and a bright red bark, which features make them very attractive in winter. *C. alba sibirica* (7 ft. high) is one of the most striking in this connection, and has white flowers in early summer. It will make a nice shrub for the bog or marsh garden; so will *C. florida* with white flowers. Two dwarf-growing species, *C. canadensis* (6 in.) and *C. suecica* (3 in.), are hardy herbaceous perennials, especially useful for carpeting under and amongst small shrubs in the rock garden. *Culture.*—Sow seed under glass, or propagate by means of layering in October, or by suckers in November. Plant out in spring or early autumn in the shade, and preferably in a mixture of moist leaf-mould and peat, or in ordinary soil. When the branches are overcrowded thin out after flowering.

Corokea.—Pretty, half-hardy evergreen shrubs, that grow to about 6 feet in height, and in May bear fragrant yellow or white star-shaped flowers. They do best in a warm, sunny position and in ordinary soil, and are well worth cultivating in the rock garden. *Culture.*—Plant in April or October, and prune only to keep in shape. To propagate, strike half-matured cuttings in a frame in August. *Species.*—*C. buddleioides* (White) ; *C. cotoneaster* (Yellow) ; *C. macrocarpa* (Orange).

Coronilla (Crown Vetch).—Most of these are half-hardy evergreen or deciduous shrubs, but some are herbaceous perennials, and amongst the dwarf-growing species of the latter class are some of the prettiest plants that can be found for a dry wall or for ledges and crevices in the rock garden. They like a well-drained, sandy loam. *Culture.*—Sow seed in a frame in March, or propagate by means of division of roots in October. Plant out in March or October in a sheltered position in either sun or shade. *Species.*—*C. cappadocica* [syn. *C. iberica*] (Cream-white, July–Aug., 4 in.) ; *C. minima* (Yellow, June–July, 3 in.) ; *C. varia* (Pink, Aug.–Sept., 12–18 in.).

Cortaderia (Pampas Grass).—Cortaderia is a new name for *Gynerium*, a very beautiful perennial grass which throws up long, silky plumes in the late summer, and makes a very attractive addition to the bog or marsh garden. A sunny, sheltered position is desirable, also well-drained soil. It grows some 6 feet high, and flowers in autumn. *Culture.*—Sow seed in April, or propagate by means of division of roots in April or May. *C. argentea* has creamy-white plumes; *C. rosea* is rosy pink; and in *C. conspicua* the plumes are silvery-white.

Cortusa Matthioli (Bear's Ear).—These are beautiful dwarf-growing, rosette-like plants, closely allied to the Primula, which do best in partial shade and in rich, sandy loam and leaf-mould, where in May and June they may throw up their primula-like stems bearing flowers of lovely magenta. They are very valuable for the rock or wall garden. *Culture.*—Sow seed under glass as soon as ripe or in March, or propagate by means of division of roots in March or October.

Corydalis (Fumitory).—Pretty little hardy annual and perennial plants with prettily cut foliage that looks much too delicate to withstand the damp and cold of our climate. They may be planted in the dry wall, the paved garden, or the less prominent parts of the rock garden. These plants require shade and will do quite well in comparatively poor soil. *Culture.*—The annuals are hardly worth growing, but may be raised from seed in the usual manner. (*Perennials*) —Sow seed in the open in April, or propagate by means of division of roots in October. *Species.*—(*Perennials*)—*C. bulbosa* (Purple and Rose, May, 9 in.); *C. capnoides* (Cream, May–Sept., 12 in.); *C. lutea* (Yellow, June–Sept., 6–12 in.).

Cotoneaster (Rockspray).—This is a genus of hardy ornamental shrubs or small trees, most of which grow best in poor or chalky soil against a wall or trellis facing north or east. The species vary greatly in habit. Some grow as small trees; many kinds make erect bushes; others grow in long, arching shoots; while others again are prostrate and creeping by nature; the last-named class is valuable for the rock garden. *C. adpressa* is tight and neat in habit and its leaves assume a deep red in autumn. It is excellent for a small rock garden. *C. congesta* is also of a neat habit, its leaves being slightly larger than those of *C. adpressa*. *C. humifusa* has larger leaves again, and is good for a fairly large garden. *C. microphylla* is a useful species; it grows well near the sea, in the shade, and under the drip of trees. *C. thymifolia* is of straggling habit, grows to a height of 18 inches, and bears pinkish flowers in April. *Culture.*—Plant in March or September. No pruning is necessary, though certain species require thinning out after flowering. To propagate, sow seed in the open in March or September, take cuttings of hard wood in a frame in July or August, or layer in September or October.

Cotula.—Hardy little trailing perennials with attractive fern-like foliage and tiny yellow composite flowers in summer. They thrive in sun or shade and in gritty loam in the chinks of a paved garden. *Culture.*—Propagate by means of division of roots in March or October, and plant out in permanent position. *C. dioica* and *C. squalida* are the best known.

Cotyledon (Pennywort).—These are dwarf-growing succulent plants valuable for the rock or wall garden. They grow to about 6 inches high, bearing their cup-like, fleshy leaves in rosettes, and flowering in June. The cotyledons are happy in sun or shade and in dry, gritty loam, and sand, and may be propagated by means of seed sown under glass as soon as ripe or in March, by division of roots in spring, or by cuttings that have been dried in the sun for a few days before they are set in the soil. This is to dry up some of the sap in the succulent stems. *See also* Echeveria.

Crassula.—A good plant for the Alpine House. It grows to a height of from 6 to 20 inches, and carries red, rose, or white flowers in summer or winter, according to species. The crassula grows well in a compost of ⅔rds sandy loam and ⅓rd crushed brick and old mortar-rubble. *Culture.*—Pot up in August or September. Keep fairly dry in winter (*Temp.* 45° F. Winter to 65° F. Summer). Water carefully, and keep the foliage dry while growing. These plants bloom well for several years. Propagate by means of cuttings in sand on a sunny shelf in the house in the summer, or by division in the spring. The cuttings should be dried in the sun for 2 or 3 days before insertion. *C. sarcocaulis* (Red, July–Sept., 12 in.) is a good species. *See* plants for the Alpine House, p. 40. *C. sarcocaulis* is hardy in most parts of the British Isles; no other species is hardy.

Crocus.—Besides those which bloom in the early spring (usually February), there are species and hybrids that flower in the autumn and winter. These less-known kinds, of which the violet-blue, September-flowering, *C. speciosus*, is one of the most lovely, are rather more delicate in shape and colouring and somewhat smaller. They are very lovely and should be much more popular than they are. These like a good light soil to which a little bone-meal has been added, and thrive in sun or shade and in a warm spot in the rock garden. *Culture.*—Crocuses are increased by offsets after the foliage or "grass" has ripened, or by seed, the former being the usual method. Offsets are treated the same as old bulbs, and will bloom the second year. Seed should be sown as soon as ripe very thinly in well-drained pans of light, sandy loam, and placed in a sheltered situation out of doors until late autumn. During heavy rain and cold weather protect with a cold frame. They may remain in the same pans during summer, but should be lifted when the foliage dies down in autumn, being planted in beds of mellow loam in the reserve garden, 2 inches apart and 3 inches deep; here they will form strong bulbs during the third summer, and a few of them may flower, most of them, however, deferring to do so until the fourth spring. Crocuses are very accommodating in regard to the depth at which they are planted. From 2 to 3 inches deep and 4 inches apart is, perhaps, the best average; autumn-flowering species from July to August; spring-flowering species in September or October. Divide and replant every third year. *Species.* — EARLY SPRING — *C. aureus* (Golden Yellow); *C. biflorus* (White, veined Violet); *C. chrysanthus* (Orange-yellow and Red); *C. Imperati* (Lilac or Buff, and

Black); *C. Sieberi* (Lilac-blue and Gold); *C. Tommasinianus* (Lavender and Orange); *C. versicolor* (White, feathered Purple); *C. vernus and vars.* (Various). AUTUMN—*C. asturicus* (Purple); *C. iridiflorus* (Lavender); *C. ochroleucus* (Yellow); *C. pulchellus* (Lavender-blue and Orange Throat); *C. sativus* (Violet, Mauve, and Orange); *C. speciosus* (Violet-blue and Orange); *C. zonatus* (Lilac-pink with Orange Throat). NAMED SPECIES—*Grandeur Triomphante* (White and Blue); *King of the Whites* (White); *Large Yellow* (Yellow); *L'Unique* (Lilac-pink); *Van Speyk* (Purple, veined White); and *Yellow Hammer* (Yellow). All grow to a height of about 4 inches.

Crucianella stylosa.—A dwarf-growing rock plant, which is sometimes used for filling a gap in the paved garden. It spreads rapidly, grows about 5 inches high, and from May to September carries clusters of small, rose-coloured flowers. A sunny position is desirable, also a gritty loam. *Culture.*—Sow seed under glass as soon as ripe or in March, or propagate by means of division in March or October. This plant must be kept in check, or it will spread overmuch and, perhaps, smother choicer specimens.

Cryptogramme crispa (Mountain Parsley Fern).—A hardy evergreen fern, growing some 5 inches high and thriving in partial shade or sun and in dry, sandy loam, peat and leaf-mould. This fern is a very effective plant for more or less shaded positions in the rock garden. *Culture.*—Plant in April. Propagate by means of division in April. *See also* Ferns.

Cryptomeria japonica (Japanese Cedar).—These are handsome evergreen trees, which do best in deep, sandy loam and in a sheltered, sunny situation. *C. japonica nana* is a dwarf species that may be grown in the rock garden. *Culture.*—Plant from September to November. No pruning is required. To propagate, sow seed in March or April, or strike cuttings in August under hand-lights.

Cupressus (Cypress).—This is a genus of quick-growing conifers, which thrive in sunny, sheltered positions and in almost any soil. *C. cæspitosa* and *C. tetragona minima* are dwarf-growing forms for the rock garden. *Culture.*—Plant in April or September. No pruning is required, except in the case of hedge-plants. Most species are propagated by means of cuttings in a frame in August or September ; some, however, are best raised from seed in March.

Cyananthus lobatus.—These are useful little perennial trailing plants of rather tufted habit, which thrive in shady positions in the higher and drier parts of the rock garden and in moist, sandy loam, and peat. Masses of lovely purple-blue, bell-like flowers are borne on 5- to 6-inch stems in June, July, and August. *Culture.*—Sow seed under glass as soon as ripe or in March, or propagate by means of division of roots in spring or autumn.

Cyclamen (Sowbread).—A genus of autumn and spring-blooming, tuberous-rooted plants, with pretty, rounded, dark-green foliage, usually marbled with white. From amongst this foliage appear short, slender stems at the end of which hang the daintiest of crimson, pink, and white star-shaped flowers with all the points of the petals curved sharply backwards. Some of the hardy, dwarf-growing species are extremely attractive and invaluable for cultivation in the rock garden. *C. coum* (3 in.), with purple-red or white flowers and dark green, rounded leaves, blooms in January or February. It is very hardy and excellent for naturalizing on a shady bank of grass. *C. ibericum*, the other well-known spring-flowering kind, also grows to a height of 3 inches, and bears crimson and purple, or crimson and white, flowers in March. The autumn-flowering species are represented by *C. europæum* (3 in.) with fragrant crimson blossoms in July and August, and *C. neapolitanum*, whose large flowers are pink with a purple throat, or pure white, and are borne, in August and September before the foliage appears, on stems 6 inches high. *C. repandum*, another excellent species, has rose-crimson flowers in May. It is not quite so hardy as the others. *Culture.*—Plant in August, 2 inches deep and 2½ inches apart, in a shady position and in well-drained, porous, light sandy loam mixed with peat or leaf-mould and ample old mortar-rubble. Protect with fibre in winter, and top-dress annually with leaf-mould and well-rotted manure. Propagate by means of seed in gentle heat in spring, and do not plant the young corms in their permanent positions until of moderate size.

Cydonia (Quince).—This genus includes hardy deciduous flowering trees and shrubs of spreading habit. They grow well in sunny positions and in ordinary soil, making exceedingly attractive subjects for a large rock garden. *C. japonica*, of which there are varieties with flowers of many shades of white, yellow, pink, or red, is often known as "japonica." When grown as a bush, it will reach a height of from 6 to 9 feet and will flower from March to June. Given the shelter of a south wall, it will often bloom as early as the end of January. A tree of dwarfed growth is *C. Maulei*, which rarely exceeds 4 feet in height. The flowers appear in March and are crimson, scarlet, orange, pink, or white. *Culture.*—Plant in October or November. Cut out old wood and shorten side-shoots in June, and prune again in winter. Propagate by means of layering, by suckers, or by taking cuttings in October.

Cynoglossum (Hound's Tongue).—This genus, whose leaves resemble the tongue of a dog, includes one or two useful annuals, biennials, and perennials, that will thrive in a rather poor soil. They bear deep blue, forget-me-not-like flowers from June to August. For use in the rock garden, we are only interested in *C. Wallichii*, a beautiful little hardy annual with deep blue flowers in July, on stems 10 inches high. It makes an invaluable addition to any rock garden. *Culture.*—Sow seeds in April or September where they are to flower in the open, and thin out when fit to handle.

Cyperus (Nut Grass, Galingale).—This is a large genus of grasses or sedges, that thrive in the marsh or water garden. They like a sunny site in marshy bog or soil at the edge of still water, and grow some 2 feet high, flowering in July and August. *Culture.*—Propagate by means of seeds, or by division of roots in March, and plant with up to 6 inches of water above the crowns.

Cypripedium (Lady's Slipper).—A genus of beautiful hardy orchids, which thrive in semi-shade and in a compost of moist, sandy peat, or moist loam and leaf-mould. They make very choice subjects for a sheltered spot in the rock garden, and are easily propagated by means of division of roots in April or September. *C. spectabile* (20 in.), with pink and white flowers in June and July, is a useful little plant for the bog or marsh garden. It is best planted in masses on a fairly moist bank. *Other Species.*—*C. acaule* (Rose and Purple, May–June, 6 in.); *C. Calceolus* (Brown and Yellow, May and June, 15 in.); *C. japonicum* (Pink, White, Green, June, 6–12 in.); *C. macranthum* (Rosy-purple, May–July, 9–12 in.); *C. montanum* (Brown, Red, White, May–July, 10 in.).

Cystopteris (Bladder Fern).—This is a genus of hardy deciduous ferns growing from 5 to 20 inches high and thriving in the shade in a compost of dry, sandy loam, leaf-mould, and old mortar-rubble. They make very decorative subjects for the rock garden. *Culture.*—Plant in March or April. Propagate by means of division of roots in March or April, or sow spores under glass in July. *See also* Ferns.

Cytisus (Broom).—This genus includes some very lovely shrubs, which are mostly hardy and deciduous, and which thrive best in a light ordinary soil, and in a dry, sunny position. The species *C. Ardoini* (Deep Yellow), *C. Beanii* (Golden Yellow), *C. kewensis* (Cream), and *C. purpureus* (Rose-purple), flowering in May and June, are all prostrate or trailing in habit and bear spikes of pea-like flowers.

They are exceptionally suitable for planting on ledges in the rock garden. They flower on the previous year's growth. *Culture.*—Cut back all branches by at least a third, and plant in October. After planting tread the soil well round the plants. Small plants give little trouble. Except when quite young, the cytisuses should only be trimmed to keep them in shape, for new shoots do not "break" easily from the old wood. Pruning must, therefore, be systematic and regular, so that it is not often necessary to cut into old wood. These spring-blooming species should be trimmed and pruned directly after flowering. Cytisuses are usually propagated by means of layering in October. Young plants need occasional "stopping-back." The genista is closely allied to the cytisus.

Dabœcia (Irish Heath).—The dabœcia is a low-growing, hardy evergreen shrub, rather straggling in habit, which grows to a height of about a foot or 18 inches, and bears purplish or white flowers abundantly from May to October. It is a native of Ireland, and thrives in partial shade and in dryish sandy peat or leaf-mould, and loam with no lime in it. The dabœcia is a most valuable shrub for the rock garden. *Culture.*—Plant out, with the soil well up to the foliage, in March or October, and cut off dead blooms in October. To propagate, strike cuttings in a frame in July or August, layer in September, or sow seed. *Species.*—*D. polifolia alba* (White); *D. p. atropurpurea* (Mauve-crimson); *D. p. bicolor* (syn. *versicolor*) (Purple and White).

Daffodils (Narcissus Family).—No spring flower is fairer or more graceful than the daffodil or narcissus. Technically speaking, the terms daffodil and narcissus are synonymous, for daffodil is merely the English for narcissus. The term *daffodil,* however, is popularly applied to those types of narcissi with long, trumpet-like corollas. The term *narcissi,* which really includes the whole genus, being reserved for those kinds with short cup-shaped corollas. For cultural details, *see* Narcissus.

Daphne.—These are beautiful dwarf-growing deciduous and evergreen shrubs, remarkable for their fragrant, waxy flowers, and for their bright red *poisonous* berries. They are not easy to cultivate, but so fragrant and beautiful are the flowers that they are well worth considerable trouble. *D. mezereum* (Purple, Rose, or White, March, 3 ft.), which is usually propagated by means of seed, is the best known of the hardy deciduous species. It thrives in ordinary garden loam, but needs shade from the hot sun. If trimming is necessary, it should be done in May. For the rock garden none are better than *D. alpina* (White, May, 1½ ft.); *D. blagayana* (Ivory, May, ½-ft.); and most lovely and fragrant of all the Garland Flowers, *D. cneorum* (Purple-pink, May–Aug., 1 ft.). They thrive in partial shade and in sandy loam and peat or leaf-mould. *Culture.*—Plant in March or October. No pruning is necessary. Propagate by layering in August, or by grafting in May. *Indoor Culture.*—*D. petræa* (Waxy Pink, April and May, 3–4 in.) is very small and a useful species for cultivation in the Alpine House. Plant in a 4–5-inch shallow pan in February in a compost of 2 parts of loam to 1 part of peat and sand, with a little lime in it. (*See* Alpine House, p. 42.) Plunge the pans in ashes in a cool, shady position out of doors from June to September. Give water in moderation, but keep on the dry side during winter. Move into the house in September. Propagate by means of cuttings of side shoots under glass in October or November, by layering in March, or by grafting in April.

Delphinium.—This is a genus comprised mainly of tall herbaceous plants. There are a few worthy of a place in the rock garden. They do best in good rich loam, and in a situation where they will be exposed to the sun. *Culture.*—Plant out in March or in September. Propagate by sowing seed in March, or by division of roots in spring or autumn. *Species.*—*D. cæruleum* (Pale Blue, Summer, 12–15 in.); *D. Pylzowii* (Dark Blue, Autumn, 12–15 in.).

Deutzia.—A genus of very lovely hardy deciduous shrubs with clusters of pretty snowdrop-like flowers (single or double) in May and June. They grow well in a sheltered, partially-shaded position and in rich, well-drained ordinary soil. Such species as *D. discolor* (2–3 ft.) with white or pink flowers; *D. gracilis* (2–3 ft.) with white single flowers; *D. scabra* and *D. scabra fl. pl.* (2–3 ft.) with white and double pink flowers respectively; and *D. Wilsonii* (3 ft.) with white flowers, all make most attractive plants for the rock garden. *Culture.*—Plant in October, mulch annually in the spring, and after flowering thin out well and cut away any weak and old wood. To propagate, strike cuttings of soft wood in June in a frame with bottom heat. All flower in May and June.

Dianthus.—A beautiful and extensive genus, which embraces the Carnation, Picotee, Pink, and Sweet William. Of these, however, the pink is the only one that interests us for rock garden purposes, and we will deal with this under Pink, *which see.*

Dicentra (Dielytra or Bleeding Heart).—These are beautiful hardy perennials, which thrive in a sheltered, sunny site, and love a light, dry soil with ample leaf-mould in it. They produce masses of fern-like foliage, above which rise long, tapering stems from which hang the most charming little heart-shaped flowers of exquisite colour. For the rock garden the most suitable species are: *D. canadensis* (5 in.) with white flowers; *D. Cucullaria* (5 in.) with white flowers; *D. eximia* (15 in.) with purple flowers; *D. formosa* (9 in.) with red flowers; and *D. thalictrifolia* (12 in.) with yellow flowers. All these flower in May and June. Although hardy, they require a certain amount of protection in winter, and if *D. spectabilis* (24 in.), with its beautiful red or white blooms, which appear in July and August, is grown, as it sometimes is, in the rock garden, it is safer to winter it in a cold frame. *Culture.*—Propagate by means of division of roots in April or September, and plant out.

Dimorphotheca aurantiaca (Cape Daisy or Star of the Veldt).—A beautiful half-hardy annual that grows to a height of about 12 inches and bears a profusion of orange-yellow star-shaped flowers from July to September. There are also several hybrid varieties arising from *D. aurantiaca* and *D. pluvialis,* these are salmon, pale yellow, and rosy-cream in colour. They like a sunny position and a light soil, and are extremely useful subjects for inclusion in the rock garden. *Culture.*—Sow seed thinly in May in a sunny position and in light soil, or sow in March under glass, ¼-inch deep in boxes in a compost of sandy loam, and plant out early in June about 6 inches apart.

Dodecatheon.—This is the American Cowslip, which thrives well in a cool, moist, shady site in the rock or marsh garden and in rich, deep, non-calcareous loam. The thick, leathery leaves grow in clumps like those of a primrose, and on the end of the stems appear umbels of beautiful cyclamen-like flowers. *Culture.*—Sow seed under glass in March, or in the open in April, or propagate by means of division of roots in March or September. *Species.*—*D. Hendersonii* (Rose, May, 6–12 in.) ; *D. Jeffreyi* (Purple-rose, June–July, 18 in.) ; and *D. media gigantea* (Lilac, Rose, and White, May–June, 12–18 in.).

Dog's Tooth Violet (Erythronium).—The Dog's Tooth Violet, or Adder's Tongue, as it is sometimes called, is a pretty bulbous plant with beautiful spotted leaves and delicate pendulous cyclamen-like blooms on stems from 6 to 12 inches high. It does well in any light soil, and is remarkably effective in the rock garden, where it flowers during April and May. *Culture.*—Plant in September 1½ to 2 inches deep and 4 inches apart, in partial shade, in moist, well-drained, sandy loam and ample leaf-mould or peat. Surround the tubers with about an inch of silver sand, and do not lift more often than necessary, but mulch annually with well-rotted manure and leaf-mould. Propagate by means of seed in a frame in August. Thin out, but do not plant the seedlings out until the third September after sowing. The plants are also increased by offsets. *Species and Varieties.*—*E. citrinum* (Yellow); *E. Frans Hals* (Purple-rose); *E. revolutum* (Pink); *E. Hartwegii* (Creamy-white).

Douglasia.—These are very effective dwarf-growing rock plants, which thrive in moist, gritty loam. They grow about 3 inches high and flower in June. They are of rather trailing habit and the foliage feels soft and silky to the touch. *D. lævigata* (Pink) and *D. Vitaliana* (Yellow) are the best species. *Culture.*—Sow seed under glass as soon as ripe or in March, or propagate by means of division of roots in March or September, and plant out in semi-shade.

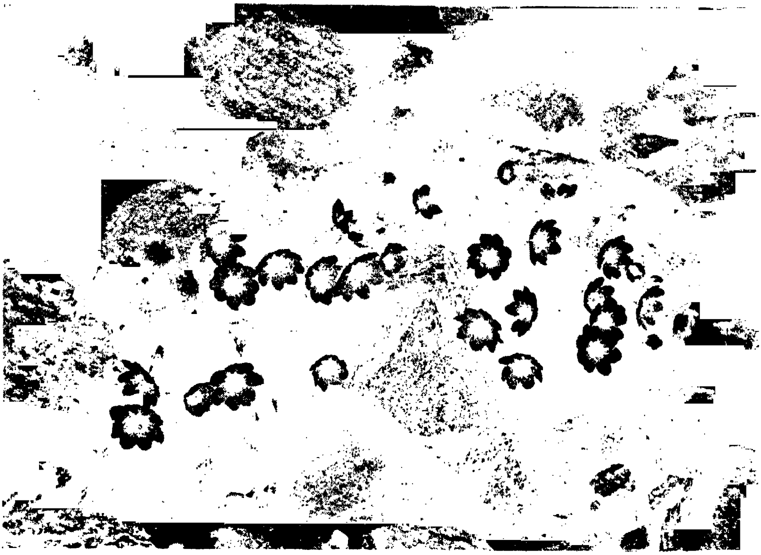
Draba.—These dwarf-growing plants, also known as Whitlow Grass, are extremely useful for crevices in the rock or paved garden, for walls, and for the moraine. They grow in little bright green rosettes which form a compact mat that is studded from March to May with tiny flowers. The drabas thrive in a moderately sunny spot, and love a well-drained gritty loam. *D. Aizoon* is also worthy of cultivation in the Alpine House, *see* p. 42. *Culture.*—Sow seed under glass as soon as ripe or in March or April, or propagate by means of division of roots in April. No protection is necessary in winter. *Species.*—*D. Aizoon* (Bright Yellow); *D. Dedeana* (White); *D. pyrenaica* (Pale Mauve-pink). All flower from March to May, and grow to about 3 inches in height.

Dracocephalum (Dragon's Head).—These hardy perennials, which bear blue onosma-like flowers, are well worthy of inclusion in either shady or sunny positions in the rock garden. They do best in a light soil. *Culture.*—Sow seed in the open in April, or propagate by means of division of roots in March or October. Cuttings may also be taken in April and struck in sandy soil in a frame. *Species.*—*D. grandiflorum* (15 in.); *D. Isabellæ* (6–8 in.); *D. parviflorum* (6 in.); and *D. Ruyschianum* (15 in.). All flower in summer.

Drosera (Sundew or Youthwort).—The foliage of these curious dwarf-growing plants is covered with glandular hairs, which cause it to look as if it were covered with dew. The leaves contract on contact, and thus entrap insects which settle on them. *Droseras* love a warm, sheltered position in the bog or marsh garden. They grow some 3 inches high and flower about midsummer. *D. rotundifolia* (White) is an attractive species, and does well in the Alpine House, *see* p. 42. Propagate by means of seed sown under glass as soon as ripe, or by means of division of roots in March. *Species.*—*D. intermedia* (White); and *D. longifolia* (Red and White).

Dryas (Mountain Avens).—Pretty evergreen hardy perennials of trailing habit, which require partial shade and a cool gritty loam with lime and leaf-mould in it. They grow about 3 inches high, flower in the summer, and are excellent subjects for carpeting and for planting on ledges in the rock garden, for they are lovely in winter as well as in summer. *Culture.*—Sow seed under glass as soon as ripe or in April, take cuttings 2 inches long and strike in sandy soil in March or September. Plant out in permanent position in spring or early autumn. They require no protection in winter. *D. octopetala*, which in June and July has large, white, strawberry-like flowers on stems 3 inches high, is the best known, and is a fascinating little plant for carpeting in the paved or rock garden. Other good species are *D. Drummondii*, with golden-yellow flowers in June and July, and *D. Sundermannii*, with creamy-white flowers in July and August.

Echeveria.—This genus comprises pretty little half-hardy, dwarf-growing, rosette-shaped plants with thick, fleshy, steely-blue leaves. They bear red and yellow flowers arranged like bells along a tall stem, and love warm, sunny, sheltered positions, but must be brought indoors in October. *Culture.*—Pot-up in March in 4- to 5-inch pots in a compost of loam and mortar-rubble. (*Temp.* 45° F. Winter to 65° F.



Dryas octopetala.

[*Malby*

Eranthis hyemalis.

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In the rock garden.

Summer.) Place in a sunny position and water well while growing, but keep fairly dry in winter. Propagate by means of offsets growing from the base of the plant ; these are easily detached and rooted in any good light soil. *See also* Cotyledon, in which genus these plants are now usually included.

Edelweiss (Leontopodium alpinum).—Contrary to the popular opinion, the *Edelweiss* is neither rare nor difficult to grow. In Switzerland it is found almost everywhere, on the mountain peaks and in the valleys below. In most gardens this hardy perennial is easily grown, especially if it can have a sunny, dry position, and well-drained, poor, sandy loam to which has been added ample old mortar-rubble. The woolly, cream-white, star-shaped flowers are borne from June to September on stems 6 inches high. The edelweiss is a quaint subject for growing on walls, in the paved garden and in crevices, or on the moraine in the rock garden. *Culture.*—Sow seed under glass as soon as ripe or in March, or propagate by means of division of roots in April, and plant out in permanent position. As it cannot stand too much damp, in winter the plant should be covered by a hand-light or a sheet of glass.

Edraianthus.—*See* Wahlenbergia.

Empetrum nigrum (Crowberry).—This is a heath-like, dwarf-growing shrub indigenous to all alpine regions, and given conditions similar to those obtaining in these parts, easy to grow. The beautiful purple flowers appear in early summer, and in the autumn these are followed by showy black berries.

Enkianthus.—Beautiful flowering shrubs, natives of China and Japan, which like a sunny, sheltered position and deep, moist peat or non-calcareous sandy loam and leaf-mould. The bell-shaped flowers are borne on short stems that radiate horizontally and in rings from the main branches. In autumn the foliage becomes a gorgeous red (in *E. japonicus*, yellow). They should certainly be planted in the bog or marsh garden. *Culture.*—Plant in October; no pruning is necessary. To propagate, strike cuttings of mature shoots in October in a frame. *Species.*—*E. campanulatus* (Cream, Yellow, and Red, May, 4–8 ft.); *E. himalaicus* (Orange-red, May–June, 10–15 ft.); *E. japonicus* (White, March, 4–8 ft.).

Epilobium (The Willow Herb).—Hardy herbaceous perennials, the dwarf-growing species of which are especially valuable for the rock garden, and the marsh or water garden, where they will sow themselves in their thousands. They do well in sun or shade on moist banks by the water-side in ordinary soil, but prefer a gritty loam with some peat in it. *Culture.*—Sow seed in the open in April, or propagate by means of division of roots in March or November, and plant out in permanent position. *Species.*—*E. Dodonæi* (Red, June–Sept., 9 in.); *E. obcordatum* (Rosy-purple, Aug.–Oct., 6 in.); and *E. rosmarinifolium* (Rose-pink, June–Aug., 24–36 in.).

Epimedium (Barrenwort).—These pretty dwarf-growing perennials thrive in sun or shade and in sandy loam with a little leaf-mould or peat added. Although the flowers are very beautiful, these plants are especially valuable because of the beauty of their foliage, which is tinted in spring and autumn. They make exceptionally valuable subjects for growing on ledges and rough places in the rock garden. *Culture.*—Propagate by means of division of roots in August. Plant out in permanent position in spring or early autumn. No protection is necessary in winter. *Species.*—*E. alpinum* (Yellow and Crimson, April–July, 9 in.); *E. Musschianum* (White, May, 9 in.); *E. rubrum* (Rose, April–May, 10 in.); and *E. r. luteum* (White and Yellow, May, 9 in.).

Eranthis (Aconite).—The Eranthis or Winter Aconite is a bright little tuberous-rooted perennial with golden buttercup-like flowers surrounded by a fringe of green. It likes a shady position and moist, sandy loam and leaf-mould. The eranthis grows about 4 inches high, and flowers in

January and February. It is a very useful perennial for cultivation in the rock garden. *Culture.*—Plant in October 2 inches apart and 2 inches deep. Do not lift from the ground. Propagation is carried out by means of division of roots in October. This plant also seeds itself freely. *Species.*—*E. cilicia* (Yellow); *E. Tubergeni* (Deep Yellow); and *E. hyemalis* (Yellow). All flower from January to February and grow about 4 inches high.

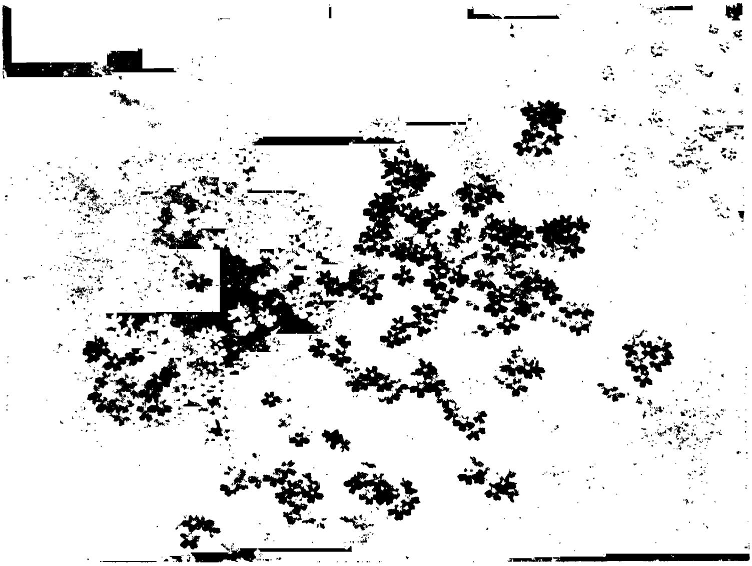
Erica.—An important genus of hardy and half-hardy evergreen flowering shrubs, often known as Heath or Heather. The hardy dwarfer species are very pleasing when grown as edgings or on slopes in the rock garden. *Culture.*—Plant in October not too firmly and with the soil well up to the foliage. They should be given a sunny or semi-shaded position in well-drained sand and peat, or in any light garden loam without lime in it. Do not prune, but merely keep the bushes in shape by removing dead blooms from the spring-flowering species in June, from the summer and autumn-bloomers in March, and from winter-flowerers in April. This removal of all shoots that have flowered is essential to the health of the plants. However carefully trimmed, the plants become straggly after five or six years and should then be removed, being replaced by younger and smaller specimens. To propagate, in July strike cuttings of half-matured wood in a frame, sow seed in the open in March, divide the roots in autumn, or layer in autumn. *Species.*—*E. carnea* (Carmine-crimson and White, Nov.–April, ½–1 ft.); *E. cinerea* [Bell or Scotch Heather] (Purple, Sept., ¾ ft.); *E. c. alba* (White, Sept., ¾ ft.); *E. c. pallida* (Very Pale Pink, Sept., ¾ ft.); *E. lusitanica* (White, Jan.–April, 3–4 ft.); *E. mediterranea* (Lilac-rose, March–May, 2–10 ft.); *E. m. alba* (White, March–May, 2 ft.); *E. Tetralix* [Cross-leaved Heath] (Pink, May–June, 1 ft.). *See also* Dabœcia.

Erigeron (Fleabane).—The erigerons are easily-grown summer-flowering plants with daisy-like blossoms on stems from 6 to 40 inches high, according to species, and most useful for cutting. They are closely related to the Michaelmas Daisies, but have a tendency to be much more trailing in habit. The species grown are hardy herbaceous perennials, which thrive in sunny situations and in ordinary soil. The dwarf-growing species, *E. alpinus* (Purple, July, 10 in.) and *E. aurantiacus* (Orange, July–Aug., 6–12 in.) are excellent subjects for the rock garden; and *E. mucronatus* (White and Pink, Summer, 4 in.) is exceptionally effective when grown on walls. This plant is also known as *Vittadenia triloba, which see.* *Culture.*—Sow seed under glass as soon as ripe or in March, in the open in April, or propagate by means of division of roots in March or October, and plant out in permanent position.

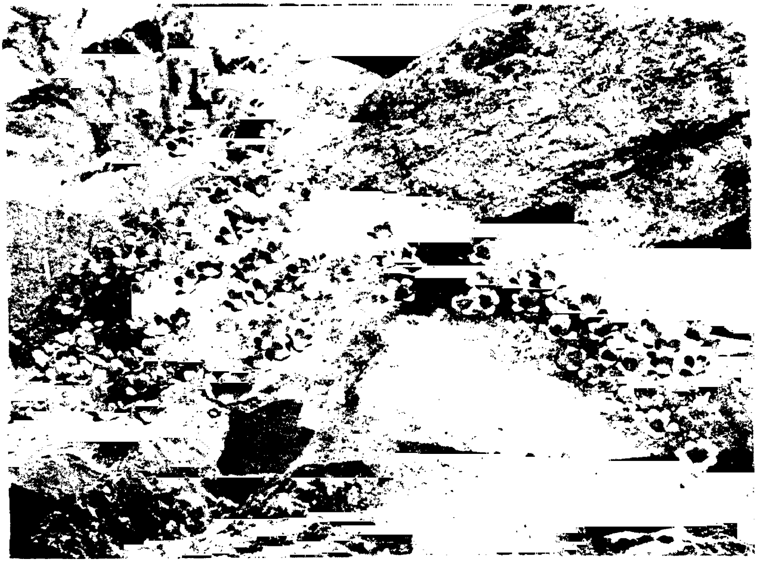
Erinacea pungens (Hedgehog Broom).—These beautiful little shrubs, which in April carry pale purple-blue, pea-shaped flowers on spiny, almost leafless bushes, are of the Broom family and natives of Spain. They love a hot, dry situation.

Erinus (Summer Starwort).—A very pretty hardy and evergreen plant, which is useful for filling in spaces between rocks, and for the crevices in paving or old walls, where it forms clumps and sends up masses of nodding flower stems throughout the summer. It spreads rapidly, grows about 4 inches high, doing well in sun or shade and in sandy loam and old mortar-rubble. *Culture.*—Sow seed under glass in March and plant out in spring or early autumn, or divide the roots in autumn. No protection is necessary in winter. *Species.*—*E. alpinus* (Lilac-rose and White); *E. carmineus* (Carmine).

Eriogonum flavum.—These are pretty little trailing plants with silvery foliage and yellow flowers in August. They like a sunny position and a well-drained, gritty loam, and are very useful in the wall garden. Seed may be sown under glass in March, or division of roots may be carried out in spring or autumn.



Erinus alpinus.



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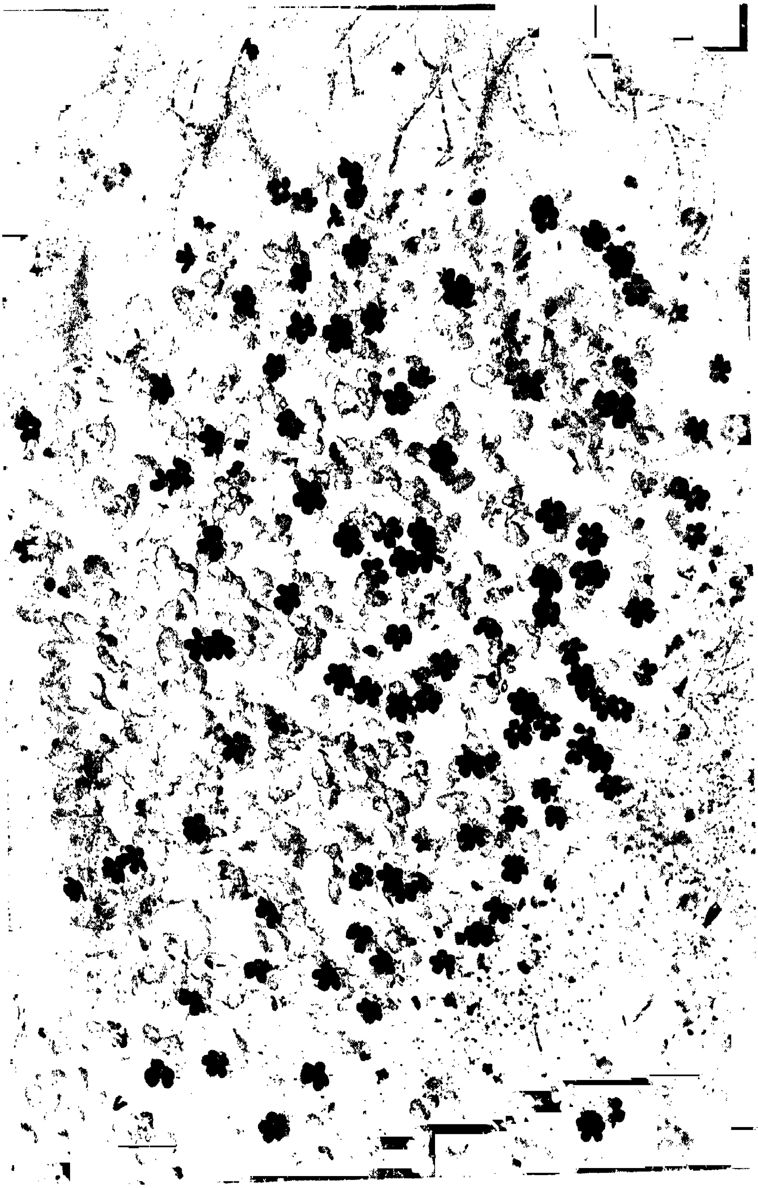
Saxifraga oppositifolia, var. grandiflora.



Eritrichium.—Beautiful hardy alpines of the forget-me-not family, that grow best in sheltered, sunny places on the moraine and in a cool compost of gritty loam, leaf-mould, peat, and sand mixed with sandstone, but which are very difficult to grow in England, even on the moraine. They will probably be happier in the Alpine House. Above all, keep moisture away from the crowns in winter. Propagation is by means of division of roots in April, or by seed. They need protection from frost and damp in winter, and must be kept just nicely moist in summer. *E. nanum* is a dazzling sky-blue flower with a yellow centre and woolly, silvery-grey leaves arranged in a tuft—like a pincushion. The flowers are borne on 2-inch stems in May.

Erodium (Heron's Bill).—These are perennials of the geranium family, which do well in sandy loam and in dry, warm, sheltered situations on rocky ledges or walls, or on the moraine in the rock garden. Some are hardy, but many are only half-hardy. In many species the fern-like leaves are silvery and fragrant and add greatly to the interest of the plant. *E. amanum* (White, May–July, 6 in.); *E. chrysanthum* (Yellow, June–Aug., 5 in.); and *E. petræum* (White, June–Aug., 3 in.), are valuable as subjects for culture in the Alpine House, *see* list, p. 42. *Culture.*—Sow seed under glass as soon as ripe or in March, take cuttings in July and strike in sandy soil in a frame, or propagate by means of division of roots in April and plant out in permanent position. *Other Species.*—*E. chamædryoides* (White, veined Pink, May–Sept., 3 in.), which is also useful in the paved garden; *E. corsicum* (Rose-pink, July and August, 3–5 in.); *E. macradenum* (White, tinged Rose and blotched Violet, June–Oct., 6 in.); *E. romanum* (Purple, April–May, 5 in.); and *E. Manescavi* (Red-purple, May–Oct., 6 in.).

Erysimum (Fairy Wallflower, Hedge Mustard).—A genus of free-flowering and exceedingly showy plants very like the wallflower in habit of growth. It includes hardy annuals, biennials, and perennials—all excellent for sunny positions in the rock garden and loving a gritty and sandy loam. *Culture.*—All species may be easily raised from seed sown in the open in April. Thin annuals out to 12 inches apart when fit to handle, and plant out others in their permanent positions in October. The perennial species are also propagated by means of division of roots in March. *E. Perofskianum*, a hardy annual 12 to 18 inches high and with small but showy orange flowers from July to October, is one of the best known. *E. rupestre* (9 in.) with sulphur yellow flowers in spring and early summer, and *E. linifolium* (6 in.) with lavender flowers from May to September, make most excellent additions to any rock garden.

Erythræa diffusa.—These are dwarf-growing plants that are worthy of inclusion in the paved garden. They like a sunny site and a gritty loam, and grow about 3 inches high. The rose-coloured flowers are borne in summer over dense little clumps of glistening green leaves. Seed should be sown under glass as soon as ripe or in March.

Erythronium.—*See* Dog's Tooth Violet.

Eschscholzia (Californian Poppy).—A showy and profusely flowering class of hardy annuals of fern-like foliage and poppy-like flowers. They are remarkable for their extremely rich and beautiful colouring and thrive in hot, sunny situations and in poor, light soil. The dwarf-growing species, such as *E. cæspitosa* (9 in.) and *E. tenuifolia*, otherwise known as *Californica cæspitosa* (9 in.), both with rich yellow flowers, make welcome additions to the rock garden. The glaucous foliage is erect and grows in tufts some 5 to 6 inches in height. *Culture.*—Sow seed thinly in the open from March to June or in the autumn, and thin out to 6 inches apart when the seedlings are fit to handle; the autumn-sown plants bloom in the early summer; the spring-sown from June to October.

Euphorbia (Spurge).—A large genus, including annuals, biennials, and perennials. Many of them are stove and greenhouse plants. The hardy perennials are the only ones that interest us here. *E. epithymoides,* 15 inches high, with yellow blooms; *E. Myrsinites,* 6 inches, with glaucous foliage and yellow flowers; and *E. Portlandica,* 9 inches, are subjects for ledges in the rock garden and like a well-drained, gritty loam and full sun. *E. palustris* (Marsh Spurge), 3 feet, may be grown in the drier parts of the bog or marsh garden. *Culture.*—Sow seed under glass as soon as ripe or in March, take cuttings in July and strike in sandy soil under glass, or propagate by means of division of roots in April or September.

Evening Primrose.—*See* Œnothera.

Fabiana (False Heath).—These are hardy evergreen summer-flowering shrubs, suitable for warm and sheltered positions. They do best in a sandy loam with some peat in it. The best known species, *F. imbricata,* is sometimes grown in the rock garden. It attains a height of some 5 feet, and in summer carries white, tubular flowers on spikes some 10 inches long. In northern counties it will need the protection of the cool house. Propagate in April or May by means of cuttings of young shoots in a warm frame, or sow seed in heat in March.

Ferns.—Hardy ferns thrive in sheltered and shady positions. They should be given a moist but well-drained deep loam with plenty of leaf-mould, peat, and coarse sand in it. They are excellent subjects for the rock garden. Dead fronds should be left to act as a protection in winter. Half-hardy kinds require slight artificial heat in winter, and tender ferns a temperature of 60° F. *See* chapter on Ferns, p. 69. *Species.*—(*Hardy*)—*Adiantum pedatum* (Maidenhair Fern); *Aspidium aculeatum* (Hard Shield Fern); *Aspidium angulare* (Soft Shield Fern); *Asplenium officinarum* (Spleenwort); *Athyrium filix-fœmina* (Lady Fern); Blechnum [syn. *Lomaria*] (Hard Fern); *Nephrodium dilatatum* (Broad Buckler Fern); *Osmunda regalis* (Royal Fern); and *Polypodium vulgare* (Polypody).

Forget-me-not (Myosotis).—There are many species of this plant: some are annual; others are perennial, many of the latter being grown as biennials. They all thrive in the sun and in moist, gritty loam, and are extremely useful subjects for the rock garden. *M. rupicola,* a dwarfer species of *M. alpestris,* only grows about 3 inches high, and likes a position on the moraine. *M. cæspitosa Rehsteineri* is suitable for the paved garden, and *M. palustris* is a valuable species for growing at the margin of still or slowly-moving water (*see* p. 130). *Culture.*—(*Annuals*)—Sow seed thinly from June to July in the open, cover very lightly with mould, and thin out to 5 inches apart when fit to handle. (*Perennials*)—Sow seed in the open from April to July, or propagate by means of division of roots in October and plant out about 5 inches apart. *Species.*—*M. alpestris* (Blue, Pink, and White, June–Aug., 6 in.); *M. cæspitosa Rehsteineri* (Blue, April–May, 2 in.); *M. dissitiflora* (Light Blue, April–June, 6–9 in.); *M. palustris semperflorens* (Sky-blue and Yellow, May–Sept., 6–9 in.); and *M. rosea* (Rose, Spring, 8 in.).

Frankenia lævis and **F. pulverulenta** (Sea Heath).—Hardy evergreen plants of dwarf habit, that are useful for the paved or rock garden. They grow from 3 to 6 inches high and flower from June to August. *Culture.*—Sow seed under glass as soon as ripe or in March, or propagate by means of division of roots in the spring. They like plenty of sun and a gritty loam to which a little peat has been added.

Fritillaria.—These are attractive hardy bulbous plants with pendant, bell-shaped flowers. They will succeed in any garden soil, although a dry, deep and rich sandy loam gives the most satisfactory results, except in the case of *F. Meleagris,* which thrives on damp banks in the marsh or bog garden. The dwarf-growing species are excellent subjects for shady positions in the rock garden. *Culture.*—Plant in October, 4 inches deep and 7 inches apart, and do not lift from the ground unless overcrowded ; when necessary lift and re-plant immediately. Propagate by means of bulbous offsets in October. *Species.*—*F. aurea* (Golden Yellow, 8 in.) ; *F. citrina* (Yellowish-green, 8 in.) ; *F. libanotica* (Lilac and Yellow, 15 in.) ; *F. Meleagris* (Purple or White, 10 in.). All flower in April and May.

Fuchsia.—Few flowers are more pleasing either in form or colour than the fuchsias. The plants have a grace and beauty peculiar to themselves. In addition to the many species so often met with in the greenhouse, there are hardy kinds that will thrive outdoors, even through severe winters. A great many that are looked upon as tender can stand a winter in the open if they are covered with 3 or 4 inches of dry cinder ashes at the first approach of frost. The best plan, in exposed positions, is to cut them right down in November and to cover the whole bed with a good coating of ashes or fibre. The ashes should not be removed until the fuchsias begin to shoot in the spring. If the bushes have not been cut down to the ground in winter, the dead ends should be trimmed off in March. Hardy fuchsias make a good show in later summer in mild districts, when several kinds are planted together, the colours being judiciously blended. They are also useful if used to form a hedge, and make effective plants for large rock gardens. Except in the south and west of England, a sheltered position is necessary. They are best planted out in March or April in light, well-drained soil with some leaf-mould in it. *Species.*—(*Hardy*)—*F. corallina* [syn. *exoniensis*] (Purple and Red) ; *F. macrostemma* (Scarlet) ; *F. m. globosa* (Violet and Purple) ; *F. Riccartoni* (Bright Red). All flower from July to September, and grow from 5 to 6 feet in height. There are numerous named varieties.

Funkia (Plantain Lily).—A genus of fine hardy herbaceous plants, some species of which are suitable subjects for the bog or rock garden. They are remarkable for their broad leaves and spikes of bell-shaped fragrant flowers, which are mostly white with a tinge of lilac. Some species have varieties with variegated or glaucous foliage and are most ornamental. They require soil that has been well-dug and enriched with manure, and thrive in sun or shade. *Culture.*—Propagate by means of division of roots in spring or autumn, and plant out in permanent position. *Species.*—*F. ovata* (Lilac-blue, July–Aug., 12–18 in.); *F. Sieboldiana* (Pale Lilac, July–Aug., 12–18 in.); *F. subcordata* (White, July–Sept., 18 in.).

Galanthus.—*See* Snowdrop.

Galax aphylla (Fairies' Wand or Carpenter's Leaf).—This is a beautiful little creeping evergreen with white flowers borne in summer on 6-inch long spikes. It has richly tinted foliage in autumn, and thrives in partial shade in the rock garden and in a mixture of moist sandy loam and leaf-mould, or preferably in peat. It is best propagated by means of division of roots in spring or early autumn.

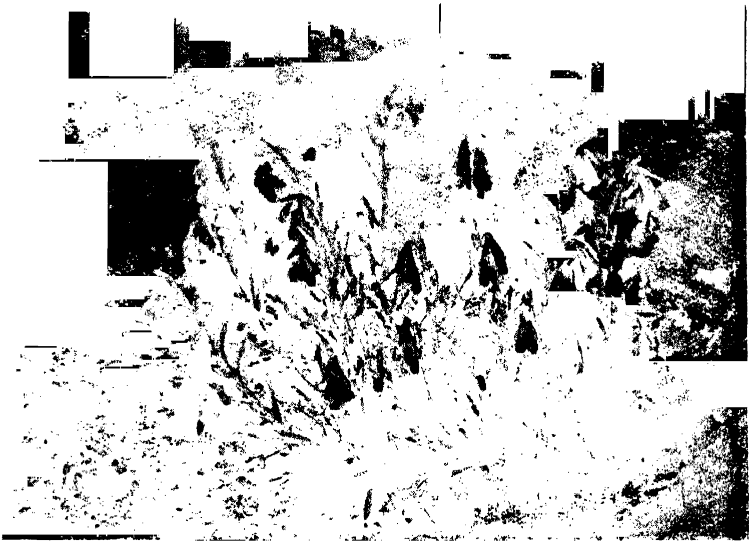
Garrya.—The only species grown to any extent is *G. elliptica*, or the Californian Garrya, a hardy evergreen shrub with long, oval leaves and yellow or greenish-yellow flowers from November to March. It forms a bush 8 or more feet in height, or may be grown as a climber on a wall. The garrya is a good shrub for planting near the sea, and is frequently employed in large rock gardens. The flowers are borne on graceful, drooping catkins some 6 inches long, which hang from the ends of the branches. *Culture.*—Plant from October to March in ordinary soil and in a sunny, sheltered position. In May trim back long shoots and cut out dead wood. To propagate, strike cuttings in August in a frame.

Gaultheria (Winter Green, etc.).—A genus of low-growing evergreen, heath-like shrubs, some of which are hardy and suitable for the marsh or rock garden. The best of the creeping or dwarf species are *G. nummularioides* with white bell-shaped flowers in August and September; *G. procumbens*; and *G. Veitchiana*, which is somewhat larger.

The tiny bell-shaped flowers, white or pink and borne in summer, are quite insignificant. *Culture.*—Plant in April or October in cool, moist, ordinary soil to which ample leaf-mould has been added, or in a mixture of peat and sand (no lime), and in a partially-shaded position. Thin out old shoots when the shrubs are overcrowded. Propagate by means of seed sown in heat in March or by division of roots or by layering in October.

Genista (Furze, Gorse).—The genistas, which are closely related to the brooms, are hardy flowering shrubs, a few of which are extremely valuable for ledges or as edgings in the rock garden, particularly such species as *G. dalmatica*, *G. glabrescens*, *G. horrida*, *G. pilosa*, *G. prostrata*, and *G. sagittalis*. No plant makes a finer show when in bloom or does better on a dry, sunny bank than *G. hispanica*, the Spanish Broom, with its golden flowers in May and June. It is a prickly and compact shrub forming a bush rarely more than 3 feet in height. Most of the species have yellow, pea-shaped flowers, which come in clusters at the end of the branches and are borne over a long period, usually in May and June, and in July and August. Another good form, flowering at the same time, is the golden, double-flowered *G. tinctoria fl. pl.*, which rarely grows more than 2 feet high. *Culture.*—Plant in October in dry, light soil and in a sunny position. The early-flowering types should have the old wood thinned out and should be trimmed into shape directly after flowering. The later bloomers should be cut hard back in February or March. The dwarf and trailing species, such as *G. sagittalis*, are usually propagated by means of layering in October. Seed may be sown in March. To propagate shrubby kinds, such as *G. hispanica*, sow seed in a frame in August, or strike cuttings of half-matured wood with a " heel " in a frame during the same month and grow on in pots until planted out.

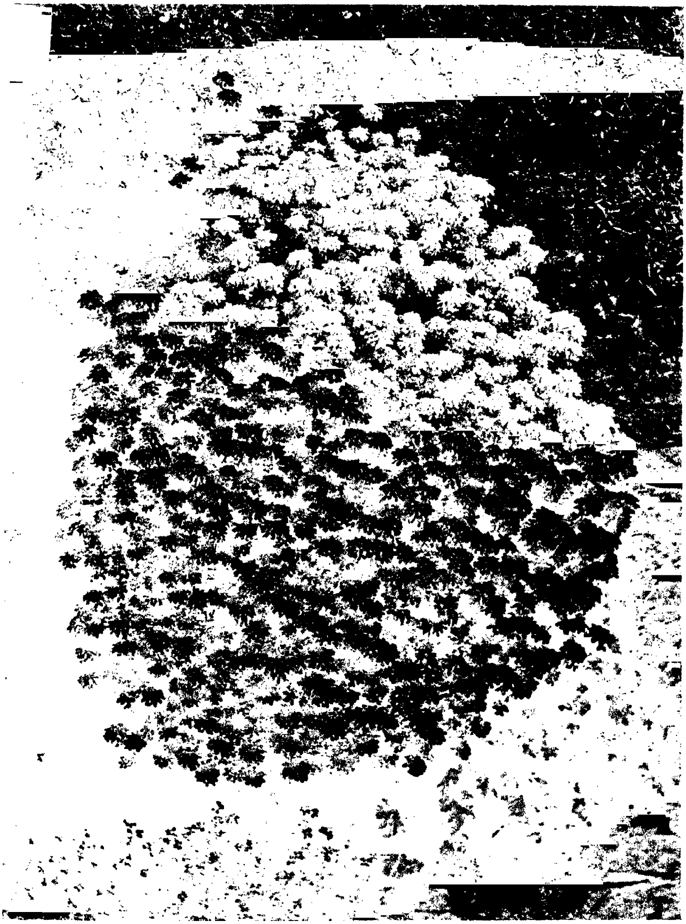
Gentiana.—All the gentians are beautiful and desirable little rock plants, that seem to hold a special lure for the rock garden lover. They vary from the most minute foliaged of plants to large dock-like specimens, and in every case carry erect and charmingly coloured cup-shaped flowers in all shades of blue and white. Most of them, save, say, *G. acaulis*, *G. asclepiadea*, *G. Kurroo*, *G. septemfida*, and *G. verna*, are none too easy to grow. At least, most of them will grow, but so many are shy flowerers, as, for instance, *G. bavarica*, *G. ciliata*, and *G. imbricata*. The gentians need great care and as much approximation to alpine conditions as possible. It seems that, above all, they must have the free, moist air of the open hills; in town gardens their cultivation is almost impossible. *G. acaulis* (Gentianella), with its large, deep mazarine blue, trumpet-like flowers in April and May, looks well in the rock garden. Most gentians require a moist but well-drained, gritty, peaty loam and leaf-mould to which has been added a fair amount of old mortar-rubble. Ample moisture is essential through the summer, and most species do best in partial shade. *G. verna* may also be grown with advantage in the Alpine House, *see* p. 42. Some, such as *G. nivalis*, *G. prostrata*, and *G. tenella*, are annuals and not worth growing. The list below shows a few of the more desirable and more easily grown species. *Culture.*—The plants are propagated by seeds sown in a frame in partial shade as soon as ripe or in March, and by division of the roots in March. Propagation by seed is, however, the better, as gentians hate having their roots disturbed. The seed should be sown in fine loam mixed with sand, and should not be too deeply covered. If the seeds are sprinkled on the surface of the compost, and a little mould is strewn over them when sown, it will be sufficient. The seeds take a long time to germinate. It is as well always to keep a few seedlings in hand, as even the so-called perennial gentians never live very long. The gentians need very firm planting, are impatient of root division, and indeed of transplanting, and when once established in any position, the plants should be



osma sericeum

[*Malby*

Gentiana sino-ornata.



[*Malby*

Iberis sempervirens, var. "Snowflake."

allowed to remain where they are. *G. acaulis* is less liable to suffer from division than other species, but even this is best raised from seed. *G. pneumonanthe* (5–10 in.), with dark blue flowers in June, July, and August, looks well massed in the bog or marsh garden.

GENTIANA FOR THE ROCK GARDEN

Name	Colour of Flowers	Flowering Period	Height in Inches	Soil, Site, etc.
**G. acaulis* (and vars.)	Rich Blue [Yellow Throat] and White	April–May	3	Well-drained, deep, gritty loam with leaf-mould or peat
G. Andrewsii .	Violet-blue	July–Sept.	12–18	Deep, rich loam. The blooms rarely open
G. angulosa .	Dark Blue	May–Aug.	5–6	Deep, gritty, sandy loam, with a little peat. Very beautiful
G. asclepiadea .	Deep Azure Blue	July–Sept.	20	Moist, sandy loam or peat. Crevice in Wall or Marsh Garden
G. excisa . .	Dark Blue	May–Aug.	3–4	Useful for the Miniature Rock Garden
G. hexaphylla .	Pale Blue	August	3–4	Excellent for the Miniature Rock Garden
G. Kurroo . .	Bright Blue [White-spotted Throat]	Aug.–Sept.	4–8	Deep and well-drained. A delightful plant
**G. pneumonanthe*	Deep Blue	June–Aug.	8	Well-drained, moist loam, with peat, if possible. Bog or Marsh
G. Przewalzkii .	Azure Blue	July–Aug.	5–7	Easily grown and very beautiful
G. septemfida .	Blue and White	June–Aug.	12	Moist and cool, sandy loam. Easily grown
G. sino-ornata .	Azure Blue	June–Aug.	6	Sandy loam and peat or leaf-mould, and ample stone chippings
G. verna . . .	Deep Blue and White	April–May	3	Deep, gritty, sandy loam. Beautiful, and one of the best

* Indicates species that like a position in full sun. The others all prefer semi-shade.

Geranium (Crane's Bill).—The term geranium can be taken to cover both sections of plants to which the names geranium and pelargonium are usually applied. The former, however, is more generally assigned to the hardy sorts, while the latter includes all the show varieties, half-hardy bedding plants, etc. The dwarf kinds of hardy geranium are most suitable subjects for the rock garden, and thrive in sunny, open sites, on rocky ledges, dry walls, or on the moraine, and in well-drained, poor, sandy, and gritty soil. An autumnal dressing of granite chips will help them to survive the winter. *Culture.*—Sow seed in March or August (under glass), or in April in the open, or the plants may be increased by division of roots from March to October. Cuttings of matured side-shoots can also be struck in a frame in August. *Species.*—*G. argenteum* (Rose-pink, 4 in. [Silvery Foliage]) ; *G. cinereum* (Red-purple, 4 in.) ; *G. Farreri* (Pink, 6 in.) ; *G. lancastriense* (Rose and Crimson, 6 in.) ; *G. sanguineum* (Crimson-purple, 9 in.) ; and *G. s. album* (White, 9 in.). All flower from June to September.

Geum (Avens).—These are beautiful hardy perennials with brilliant yellow, orange, or red flowers and leaves like those of the strawberry. They thrive in sunny, open situations. The rock garden species, which grow from 6 to 15 inches in height, love a deep, gritty loam. *G. reptans* and *G. rivale* require plenty of moisture, and are suitable subjects for the bog or marsh garden. *Culture.*—Sow seed in the open in April, or propagate by means of division of roots in March or October and plant out in permanent position. *Species.*—*G. coccineum* (Scarlet, 14 in.) ; *G. Heldreichi* (Orange-red, 12–15 in.) ; *G. montanum* (Yellow, 6 in.) ; *G. reptans* (Golden-yellow, 10 in.) ; *G. rivale* [Leonard's] (Crimson-pink, 10 in.). All flower from April to October.

Globularia (Globe Daisy).—Dwarf-growing shrubby perennials, which should be grown in the sun and in moist, light loam and leaf-mould. They are delightful plants for the paved garden or for the rock garden, forming a carpet of small, glossy, dark green foliage. *Culture.*—Sow seed under glass as soon as ripe or in March, or propagate by means of division of roots in April or September. *Species.*—*G. cordifolia* (Greyish-blue, May–July, 4 in.); *G. nana* (Pale Blue, May–July, 2 in.); and *G. trichosantha* (Blue, May–July, 8 in.).

Golden Rod (Solidago).—This genus comprises graceful hardy perennials of vigorous habit, which thrive in sun or shade and in almost any soil. They are showy plants for the bog or marsh garden, growing from 4 to 8 feet high, and from August to October carrying golden, feathery spikes of bloom. Propagate by means of division of roots in spring or autumn, or seed may be sown in the usual way in April. *Species and Varieties.*—*S. altissima* (8 ft.); *S. canadense* (4 ft.); and *S. Golden Wings* (6 ft.).

Grammanthes.—Dwarf-growing, succulent, half-hardy annuals, growing from 4 to 6 inches high and flowering from July to September. They do best in the sun and in light, sandy soil, and are valuable for growing in warm, sheltered portions of the rock garden. *Culture.*—Sow seed thinly as soon as ripe or in spring under glass in a cool house, prick-off into boxes when fit to handle, harden-off gradually, and plant out 4 inches apart in June. *G. gentianoides* (Yellow) is the best-known species.

Gunnera.—These ornamental foliage plants, like giant rhubarbs, thrive in rich soil and in sheltered, shady positions. They are hardy perennials and are valuable for the margins of lakes, and for shrubberies. *Culture.*—Sow seed in heat as soon as ripe or in March, and plant out in June, or propagate by means of division of roots in April. The crowns require a slight protection in winter in the form of a mound of ashes or fibre over them. *G. scabra* (Crimson, Aug., 5 ft.) is the best, *G. manicata* being much larger, though scarcely so beautiful.

Gypsophila (Chalk Plant, or Gauze Flower).—The gypsophila genus includes hardy annuals and perennials with graceful sprays of lace-like flowers on tall stems. They thrive in the sun and in dry, well-limed loam. A good deal of coarse grit should be added to the soil. The dwarf-growing kinds are compact, and make excellent subjects for edgings, for growing on ledges, for crevices in walls, or in the rock garden. *G. cerastioides* is a delightful plant for the paved garden. *Species.*—(*Annual*)—*G. muralis* (Pink, 6 in.). (*Perennials*)—*G. cerastioides* (White, veined Red, 3 in.); *G. prostrata* (White or Pink, June, 5 in.); and *G. repens* (White and Pink, 4–6 in.). All flower from May to September.

Haberlea.—These hardy herbaceous perennials of the gloxinia family are especially suitable for a shady spot in the rock garden. They do well in vertical crevices exposed to the north and east, on rocky ledges, or in the moraine. They need a compost of moist peat, leaf-mould, and sand. *Culture.*—Sow seed under glass as soon as ripe or in March, or propagate by means of division of roots in April. *H. rhodopensis* (Lilac, May–July, 6 in.), whose deep green leaves form a neat rosette, is a favourite, so also is the variety *H. r. virginalis* (White). *H. Ferdinandi-Coburgi* (Violet-blue, May–July, 6–8 in.) is also well worth growing.

Halesia (Silver Bell or Snowdrop Tree).—The halesia is a hardy deciduous tree, which grows in England to a height of from 10 to 15 feet, and which in summer carries clusters of drooping white flowers like those of the snowdrop. It thrives in well-drained, moist, sandy loam and in a sunny, sheltered site. A position close to a pond or stream in the water or marsh garden suits it admirably. *Culture.*—Plant in October, thin out the branches when they are overcrowded. To propagate, sow seed in a frame in March, or take cuttings in October. *H. corymbosa, H. hispida,* and *H. tetraptera* are the best-known species.

Hamamelis (Witch Hazel).—These small deciduous trees or shrubs thrive in sunny positions and in moist but well-drained loam with plenty of peat and leaf-mould in it. They are suitable subjects for the bog or marsh garden. The quaint, fragrant flowers, each with four narrow petals, that in some species are twisted and folded, are borne in the autumn and early in the year. *Culture.*—Plant in October and November. Just thin out and trim the branches in April when they are overcrowded. To propagate, sow seed when ripe in a frame, layer in late summer, or graft on seedling stocks of *H. virginica.* *Species.*—*H. arborea* (Yellow and Red, Jan.–Feb., 10–20 ft.) ; *H. japonica var. Zuccariniana* (Pale Yellow, Dec.–Feb., 3–6 ft.) ; *H. mollis* (Golden-yellow, Chocolate Centre, Nov.–Dec., 8 ft.).

Hedysarum.—A genus of flowering plants, including biennials, hardy herbaceous perennials, and shrubs. Amongst the perennials are several charming little plants for the rock garden. They should be grown in the sun and in ordinary soil. *Culture.*—Sow seed in the open in April, or propagate by means of division of roots in March. *Species.*—*H. alpinum* (Purple-red, June-Aug., 6 in.), a dwarf form of *H. neglectum* ; *H. boreale* (Purple, June–Aug., 6 in.) ; *H. microcalyx* (Purple, June–July, 20 in.) ; and *H. neglectum* (Purple, June–Aug., 18 in.).

Helianthemum (Rock Rose).—These brilliant, shrubby evergreens are of trailing habit, and flower in the spring and summer. They make lovely clumps of bluish-green foliage, thickly splashed for two or three months in the year with brightly-coloured flowers very like those of the strawberry. These, unfortunately, fall the day they open, but this defect is made up for by the fact that the buds on the same bush open over a period of two or three months. The flowers of the varieties of *H. vulgare* (4–12 in., flowering in June and July), which are single or double, may be had in almost any shade of crimson, scarlet, rose, orange, yellow, or white. Yellow is the prevailing colour of the flowers of the other species. The dwarf-growing kinds grow from 2 to 12 inches high. They love the sun and do best on dry banks, or on walls or rocky ledges in the rock garden and in sandy soil. Some species are valuable for the paved garden. *Culture.*—Plant in March or October. "Stop" back long, weak shoots in August. They need no protection in winter. To propagate, sow seed under glass as soon as ripe or in March, or take cuttings in July or August and strike under glass in sandy soil. *See also* Cistus. *Species.*—*H. croceum* (Yellow, May–Sept., 6 in.); and *H. tigrinum* (Salmon-pink, May–Sept., 6 in.).

Helichrysum ("Everlasting Flowers").—These are mostly half-hardy or hardy perennials or annuals, which thrive in sunny positions and in gritty loam, and are mostly suitable for borders, or as pot plants indoors. The dwarf species make excellent subjects for the rock or wall gardens. *H. bellidioides* likes a position on the moraine. These dwarf-growing species are hardy perennials growing from 3 to 6 inches high and flowering from July to October. They need protection from excessive wet in winter. *Culture.*—Propagate by means of division of roots in the spring, or take cuttings in April and strike in gentle heat. *Species.*—*H. bellidioides* (White, 5 in.); and *H. frigidum* (White, 4 in.).

Helonias bullata (Stud Flower).—These hardy liliaceous plants should be grown in moist places in the marsh garden and in sandy and peaty loam. They like a semi-shaded situation and flower in April and May. The flower-spikes are some 12 to 18 inches in height and carry minute, star-like pink blooms high above the foliage, that hugs the ground upon which it is growing. The leaves soon spread into wide shiny green mats. *Culture.*—Sow seed in a frame as soon as ripe or in April, or propagate by means of division of roots in April or October.

Helxine.—These are creeping plants with pretty green foliage and inconspicuous flowers. They make excellent subjects for cultivation in the paved or rock garden, and do best in sun or shade and in gritty loam. Propagation is best effected by means of division of roots in the spring.

Hemerocallis (Day Lily).—Hardy perennials, which do well in moist, light and deep soil in a shady spot in the marsh garden. As the name implies, the flowers, once open, last only a day or so, but a succession of bloom extends over two or three months. The flowers are useful for cutting. Propagate by division of roots in April or November. *Species and Varieties.—H. aurantiaca* (Apricot-orange); *H. Dumortierii* (Yellow and Reddish-brown); *H. var. Gold Dust* (Golden-yellow); *H. var. Sovereign* (Orange Yellow); *H. var. Kwanso fl. pl.* (Bronze-yellow). All flower from May to August, and grow from 12 to 36 inches in height.

Hepatica.—This is now included in the genus Anemone, *which see.*

Heracleum (Cow Parsnip).—These tall hardy biennials and perennials thrive in the sun and in ordinary soil on moist banks. Many of them are valuable plants for the bog or water garden. All carry white flowers; the biennials blooming from May to July, the perennials from June to October. The biennials are hardly worth growing. *Culture.*—(*Perennials*)—Sow seed in April in the open, or propagate by means of division of roots in April or October. *Species.*—(*Biennial*)—*H. asperum* (3 ft.); (*Perennials*)—*H. Leichtlinii* (6 ft.); and *H. persicum* (10 ft.).

Herniaria.—These are quaint little creeping plants with pretty green foliage and inconspicuous greenish-yellow flowers. They make excellent subjects for the paved or rock garden. These little plants like a sunny position and a gritty loam, and are propagated by means of division of roots in the spring.

Heuchera (Alum Root).—Beautiful hardy herbaceous perennials, which do well in warm, rich, and light soil. They love a sunny situation, where they will send up spikes of red and pink flowers like those of the London Pride. The dwarf-growing species are deserving of a place in the rock garden. *Culture.*—Sow seed in the open in April, or propagate by means of division of roots in April or October. *Species.*—*H. americana* (Purple); *H. glabra* (Pink);

and *H. sanguinica* (Reddish-pink). All grow about 12 inches high. *H. hybrida* (Red to White), some 20 inches high, may also be grown in large rock gardens where more space is available. All flower from May to September.

Hieracium (Hawkweed).—Some of the dwarf-growing species of these hardy herbaceous perennials thrive in ordinary soil and love a sunny site in the rock garden. *Culture.*—Sow seed in the open in April, or propagate by means of division of roots in April or September. *Species.*—*H. alpinum* (Yellow, July, 6 in.); *H. Bormülleri* (Yellow, June–Aug., 12 in.); and *H. villosum* (Golden-yellow, July, 9 in.).

Horminium pyrenaicum (Pyrenean Dead Nettle).—An attractive hardy perennial with large, flat, crinkly leaves. Its blue flowers are carried in summer on upright stems some 9 inches long. This plant may be included in a selection of plants for the rock garden, and thrives in a dry, sunny crevice and in gritty ordinary soil. Propagate by means of division of roots in spring or autumn.

Hottonia palustris (Water Violet).—These beautiful hardy aquatic perennials should be grown in a sunny position in still water. The showy lilac and yellow flowers, which are borne at water-level, appear in May and June. *Culture.*—Sow seeds in ordinary soil in shallow water in March, or propagate by means of division of roots in April, and plant at the water's edge with from 1 to 3 feet of water above the crowns. *See also* the chapter on The Water Garden.

Houstonia cærulea.—These are pretty little evergreen rock plants of creeping habit and are smothered with pale blue star-shaped flowers in May and June. They only grow about 3 inches high, and thrive on shady ledges in well-drained, moist, sandy loam. Seed may be sown under glass in March, or propagation carried out by means of division of roots in September.

Hutchinsia.—Dwarf-growing hardy annuals and herbaceous perennials, which thrive in semi-shade and in cool, sandy, and gritty loam. The best-known species is *H. alpina*, a pretty little plant with evergreen fern-like foliage, that looks well in the paved or rock garden. It grows about 6 inches high and from June to August bears small white flowers. *Culture.*—Seed may be sown as soon as ripe in March under glass, or propagation may be carried out by means of division of roots in spring or autumn.

Hyacinth.—Several of the dwarf species of hyacinth should be employed to obtain early colour in the rock garden. *Hyacinthus azureus*, which grows about 4 inches high and carries beautiful blue flowers in February, is well worth growing. *Culture.*—Plant the bulbs in September, 3 inches deep and 3 inches apart. They like a sunny position and well-manured, sandy loam and leaf-mould. Cut off the stems of the dead flowers, but do not lift the bulbs after flowering.

Hypericum (St. John's Wort, Aaron's Beard or Rose of Sharon).—This genus includes a number of shrubs, some of which are evergreens, others are deciduous; many are quite hardy, others need the protection of a greenhouse. There are also hardy annual and hardy herbaceous perennial species with dense foliage and bright yellow flowers. The annuals are hardly worth growing, but some of the dwarf-growing perennials and evergreen shrubs make excellent subjects for edgings, carpeting, rocky crevices, walls, or for the moraine. Sandy loam and a sunny site suit them best. *H. Coris* and *H. tomentosum* should be protected by means of a piece of glass in winter. *Culture.*—(*Perennials*)—Sow seed in the open in April, divide the roots in March, or take cuttings in September and strike in sandy soil. Plant out in March. (*Shrubs*)—Plant in October; cut well back in March. Propagate by means of cuttings in July. *Species.*—(*Perennials*)—*H. crispum* (12 in.); *H. gracile* (5 in.); *H. tomentosum* (6–9 in.). (*Shrubs*)—*H. Coris* (3 in.); *H.*

cuneatum (3 in.); *H. Moserianum* (12–18 in.); *H. nummularium* (Trailing); *H. reptans* (Bright Green, Trailing Foliage). All flower from July to August, except *H. tomentosum*, which blooms from August to October.

Iberis (Candytuft).—There are hardy annual and perennial species of this exceedingly beautiful and favourite flower, both of which succeed in any soil with lime in it, but prefer dry, sandy loam and a sunny position. The perennials, which are mostly shrubby evergreens, make very useful subjects for edgings or for crevices in the rock garden, and some kinds, such as *I. saxatilis*, are happiest in the moraine. *I. sempervirens* (Evergreen Candytuft) quickly forms an imposing tuft on a rock edging or when used as a wall plant. The bold masses of strikingly white flowers in spring are most effective, while during the rest of the year the tuft of glossy, dark green foliage is very pleasing. Some of the older and more straggling shoots should be cut well back to the roots every three or four years. *Culture.*—Sow seed under glass as soon as ripe or in March, or in the open in April, or propagate by means of division of roots in April or October. Cuttings may also be struck in a frame about the end of July or early in August. *Species.*—*(Perennials)*—*I. gibraltarica* (Lilac-pink, May-July, 12 in.), this needs a warm and sheltered position; *I. petræa* [*saxatilis*] (White, tinged Red, May, 3 in.); and *I. sempervirens* (White, May–June, 6–12 in.).

Ice Plant (Mesembryanthemum crystallinum).—This is a useful and effective half-hardy annual for rock-work, thriving in any fairly good soil, and in a dry and sunny situation. The white or pink flowers are borne in August amidst thick, fleshy leaves on stems some 5 inches high. *Culture.*—Sow seed thinly in rich, light soil as soon as ripe, or in March, in gentle heat. Pot-up in 3-inch pots as soon as possible, harden-off gradually, and plant out 12 inches apart early in June. Keep the young plants well supplied with water until the roots get hold of the soil. When once established, they will only require to have the ground kept free from weeds and the shoots pinched out so as to prevent overcrowding. In hot, dry weather, weak manure-water may be given frequently with advantage. Propagation may also be carried out by means of cuttings of half-matured shoots in spring.

Incarvillea.—Hardy tuberous-rooted perennials growing from 6 to 36 inches in height, carrying large gloxinia-like flowers from May to August on spikes rising above dark green, dandelion-like foliage. The small-growing species are very valuable for the rock garden. They thrive in well-drained, rich loam and in sunny borders. *Culture.*—Sow seed in pans in a frame as soon as ripe or in April, thin out, and plant out in spring or autumn. Seed can be sown in the open early in May; the plants may also be increased by division of roots in March or October. *Species.*—*I. Delavayi* (Crimson-pink or Purple, 15 in.) and *I. grandiflora* (Bright Pink, 6 in.) are the most popular.

Ionopsidium (Violet Cress).—A plant so called from its violet-like appearance. Only two kinds are grown—*I. acaule*, with white flowers tinged with purple or with lilac flowers, and *I. album*, with white flowers. Both are small, not exceeding 3 inches in height, and flowering so profusely all summer that they hide their foliage with a smother of blossom. These delightful dwarf hardy annuals are reproduced by self-sowing in their growing positions. They should be grown in the shade and in any rich, damp soil. They make pretty little plants for crevices in the rock garden.

Iris.—This beautiful and useful genus needs no introduction. It contains hardy plants with bulbous or spreading tuberous or rhizomatous roots and most beautiful and varied flowers. It is usually divided into two sections—namely, the bulbous and the non-bulbous or rhizomatous-rooted. To the latter class belong the Flags or Bearded Irises, the Kæmpferi or Japanese group, and the Sibirica Irises; to the bulbous class belong the English, Dutch, and Spanish Irises. Many are far too large, but the dwarf bearded irises, with blue and orange, violet-purple, and sky-blue flowers in April and May, and which grow from 4 to 9 inches high, make most striking plants for ledges in the rock garden. They thrive in sun or shade and love a mixture of loam, peat, and sand. The spring-flowering Hybrid Crimean and Bulbous Irises, with blooms similar in colour to those described above and which grow from 4 to 12 inches high, are also beautiful, if grouped in the rock garden. They like a sunny position and a gritty loam. The Japanese Irises love marshy land, require a position in full sun, and should occasionally be transplanted and divided in August after blooming. They are most effective in the bog or marsh garden. The cultivation of nearly all the irises is simple, the plants succeeding in a sunny position and in any light, rich garden soil, though sandy loam with 50 per cent peat or leaf-mould is most suitable for the bulbous species. All love ample, thoroughly rotted manure.

Culture (Bulbous-rooted).—Plant the bulbs 3 to 4 inches deep in September or October in a sunny position amongst carpeting plants, with a little sand round the bulbs, as they hate damp, muggy winters. Most spring and autumn-flowering species require to be lifted from the ground in August ; summer-flowering kinds should be taken up every third year, in October, after the plants have died down. They are propagated by means of offsets in September or October.

Non-bulbous or Rhizomatous Species.—Plant out in August or September (dwarf) 5 inches apart. The upper part of the rhizomes should lie on the surface of the soil, so as to be exposed to the air and sun. The dwarf bearded rock species may be propagated by seed sown in September under glass, by offshoots in October, or by division of roots in the spring after flowering. Lift and re-plant the rhizomes triennially.

Species. — BULBOUS-ROOTED. SPRING-FLOWERING. —*I. histrio* (Lilac-blue and Yellow, Jan.–Feb., 6 in.) ; *I. persica Heldreichi* (Purple, Yellow, and Green, March, 4 in.) ; and *I. reticulata Krelagei* (Purple-red, netted with Orange, Jan.–Feb., 8 in.).

NON-BULBOUS OR RHIZOMATOUS.—*I. cristata* (China Blue with Gold Stripe, 8 in.) ; *I. cuprea* [syn. *fulva*] (Reddish-bronze, June–July, 20 in.) ; *I. fœtidissima* (Bluish-lilac or Yellow, June, 30 in.) ; *I. Kæmpferi* (Various, July–Sept., 18–30 in.) ; *I. lacustris* (Lilac-blue with Gold Throat, 10 in.) ; *I. monnieri* (Yellow and White, June–July, 36–48 in.); *I. monspur* (Light Blue, Lavender, or Violet, July–Aug., 50 in.) ; *I. ochroleuca* (White and Yellow, June–July, 48 in.) ; *I. pumila* (Violet-purple and White, flecked with Blue, 10 in.) ; *I. sibirica* (Blue, White, and Yellow, May–June, 36 in.) ; *I. spuria* (Deep Blue, June, 40 in.) ; *I. stylosa* [syn. *unguicularis*] (Various, Nov.–March, 6–15 in.). Named varieties are innumerable and catalogues should be consulted.

Itea virginica.—This is a hardy deciduous shrub, which grows to about 5 feet high, and in July carries racemes of white flowers. It likes a moist, peaty soil and partial shade, and makes a most attractive plant for the bog or marsh garden. *Culture.*—Plant in October, and thin out the branches when these are overcrowded. Propagate by means of seed sown in the open in April, by suckers in October, or by layering in August.

Ivy (Hedera).—There are many kinds of this well-known climber. The common sorts thrive against walls and in ordinary rich soil ; the variegated kinds prefer walls facing south or west, and like ample lime in the compost. *Culture.*—Strike cuttings in autumn in sandy soil in a shady border ; plant out in dry, open weather between the following October and April. When established old leaves and untidy shoots need clipping hard back in April. *Species.*—*H. angularis* (Green Leaves) ; *H. atropurpurea* (Crimson-bronze Leaves, Winter); *H. dentata* [Irish Ivy] (Large Green Leaves); and *H. helix* (Common Ivy).

Ixia (African Corn Lily).—These are pretty half-hardy bulbs with spikes of graceful, star-like flowers carried in May and June on stems some 15 inches tall. They should be grown in warm, dry, sunny places in the rock garden, and do best in a compost of rich, sandy loam and leaf-mould or peat. *Culture.*—Plant the bulbs in September 4 inches deep and 3 inches apart; do not lift after flowering, but in winter cover the bulbs with ashes or fibre. Propagate by means of seed sown in a frame in September, or by means of offsets in October. Seedlings take three years to flower. *Named Varieties.*—*Bridesmaid* (White); *King of the Yellows* (Yellow); *Queen of the Roses* (Rose); *Excelsior* (Red); *Alice* (Pale Yellow and Lavender); and *Azurea* (Blue, Purple Centre).

Ixiolirion (Ixia Lily) [*I. montanum* and its varieties].—These are half-hardy bulbous plants, which grow about 15 inches high and flower in June. The flowers are either white or of different shades of blue. They do well in well-drained, sandy loam, and love a warm, sunny corner in the rock garden. *Culture.*—Plant the bulbs in September 5 inches deep and 3 inches apart; do not lift the bulbs after flowering, but protect them with fibre during winter.

Jankæa Heldreichi (syn. *Ramondia Heldreichi*).—Beautiful little rock plants with silver-grey foliage and very pale blue flowers. They grow from 3 to 4 inches high, and thrive on sheltered ledges or in the Alpine House where wet and moisture cannot damage them. Plant in April or September in a compost of fibrous peat, loam, and silver sand. Propagation may be carried out by means of leaf-cuttings (*see* p. 103) placed in sand in July, and grown on in heat, or seed may be sown in March or April. Shade under a north wall in summer.

Jasione (Sheep's Scabious).—These are pretty dwarf-growing plants, forming tufts of narrow leaves and carrying rounded heads of blue flowers on slender stems in summer. They like a semi-sheltered but sunny position, and do best in a sandy and gritty loam. Seed may be sown under glass as soon as ripe or in March, or the plants may be propagated by means of division of roots in spring or early autumn. *J. humilis*, 5 in.; *J. Jankæ*, 6 in.; and *J. perennis*, 9 in., are good species.

Juniper (Juniperus).—These are handsome evergreen trees and shrubs, which grow best in moist, well-drained, deep loam and in sunny positions. They make very effective plants for prominent positions in the bog or marsh gardens, and such dwarf species as *J. communis nana*, *J. communis compressa*, and *J. sabina tamariscifolia*, will be found very decorative in the rock garden. *Culture.*—Plant in May or September; no pruning is required. To propagate, strike cuttings in a frame in September.

Kalmia (American Laurel).—Hardy evergreen shrubs, which should be treated in the same way as rhododendrons (*which see*). They should be given a moist situation, preferably in the marsh garden, and need a non-calcareous soil, as they are lime-haters. To propagate, sow seed in a frame in spring, strike cuttings in a frame in October, or layer in October. *Species.*—The best known are: *K. glauca* (The Swamp Laurel), with its purple flowers in April and May, which grows about 2 feet high; *K. latifolia* (The Calico Bush or Mountain Laurel), with its rose and white flowers in June and which grows to a height of 6 feet; *K. angustifolia* (The Sheep Laurel), which makes a bush some 3 feet in height and bears clusters of purple-red or white flowers in June.

Layia (Tidy Tips).—These hardy annuals are suitable for sunny parts of the rock garden. They grow to a height of about 10 inches and flower from July to September. Ordinary garden soil suits them well. *Culture.*—Sow seed thinly ¼ inch deep in April, and thin out when the seedlings are fit to handle to about 6 inches apart. *Species.—L. densiflora*

(Mauve and White) ; *L. elegans* (Yellow, margined White) ; and *L. glandulosa* (White).

Ledum (Labrador Tree).—Hardy evergreen shrubs, which are best planted in cool, moist loam deficient in lime. They will grow in sun or semi-shade. *Culture.*—Plant in May or September ; no pruning is necessary. Propagate in September by means of layering or cuttings, or by seed sown in spring. *Species.*—*L. buxifolium* (Pink and White) ; *L. latifolium* (White, tinged Pink) ; and *L. palustre* (Pink). All these grow to a height of from 2 to 3 feet, and from April to May carry clusters of small flowers.

Leiophyllum buxifolium (Sand Myrtle).—The Sand Myrtle is a hardy evergreen shrub of compact growth, that is useful for the rock garden. It thrives in cool, peaty loam and in full sun, and carries masses of shiny, dark-green, box-like leaves and in May and June clusters of small white flowers. In height, this shrub rarely exceeds 18 inches. *Culture.*—Plant from April to September. Propagation is by means of seed sown in a frame in spring, or by layering in September.

Leontopodium.—*See* Edelweiss.

Leptosiphon (syn. *Gilia*).—A charming tribe of hardy annuals including several little plants that are extremely useful for setting in crevices in the rock garden, on dry walls, and in the paved garden. *L. hybridus, L. aureus, L. rosea,* and *L. lilacinus* are among the most suitable. They carry dense heads of brilliantly-coloured Phlox-like flowers, and thrive in full sun and in any light, rich soil. The leptosiphons are easily raised by means of seed sown in spring.

Leucojum (Snowflake).—These are very pretty hardy bulbs with bell-like blossoms, resembling those of the snowdrop, but much larger, and borne in clusters of six or seven. They will do well in any garden soil in semi-shade, and are delightful little plants for cultivation in the rock garden. *L. æstivum* is also suitable for the bog or marsh garden. *Culture.*—Plant in September 3 to 4 inches deep and 5 inches apart. Propagate by means of offsets or by seed. The bulbs only require lifting every seven years, and are never at their best until they have been in the soil a year or so. *Species.*—*L. æstivum* [Summer Snowflake] (White, spotted Green, May, 15 in.); *L. autumnale* (White, tinged Red, October, 10 in.); and *L. vernum* [Spring Snowflake] (White, tinged Red, March, 9 in.).

Lewisia (Bitter-root).—Pretty little rock plants suitable for a dry, sunny crevice between the rocks or on a wall. They should be provided with a well-drained, gritty loam; ample water is needed in the growing season. The succulent, fleshy leaves are borne in rosettes, and the flowers, like brilliantly-coloured stars, appear in the summer on slender stems. Protect from wet with a sheet of glass or bell-glass in winter. *L. cotyledon* and *L. Howellii* are also worthy of cultivation in the Alpine House, *see* p. 44. *Culture.*—Sow seed under glass as soon as ripe or in March, and plant out in permanent position in April. *Species.*—*L. cotyledon* (Pink, striped Buff or White, May–June); *L. Howellii* (Pink, striped with White, May–June); *L. rediviva* (Pink and White, May–Aug.). All these grow from 4 to 6 inches high.

Leycesteria (Flowering Nutmeg).—This is a hardy (in south and west of England) deciduous shrub, only one species of which is at all extensively grown, that is, *L. formosa*. It grows from 6 to 8 feet high, and in July and August carries drooping racemes of purple and white funnel-shaped flowers at the end of the current year's growth; these are followed by purple-black fruit in autumn. The plant does best in sunny, sheltered positions by the water-side and in light, well-drained soil, and will even flourish under the shade of trees. *Culture.*—Plant in October or March. Cut out wood that has flowered. To propagate, sow seed in the spring, or take cuttings in October and strike in a frame.

Libertia.—A genus of hardy iridaceous plants, some of which are valuable for the rock garden. They produce clumps of sword-like foliage, and from March to May carry blue or white iris-like flowers. These plants need a light soil. *Culture.*—Sow seed in the open in spring, or propagate by means of division of roots in March. *Species.*—*L. formosa* (White or Blue, 20 in.) ; and *L. grandiflora* (White, 20 in.).

Lilium (Lily).—There are many different species and varieties of lilies, but they are for the most part hardy bulbous perennials, all requiring practically the same management. Although not essentially plants for the rock garden, many kinds which thrive in a moist but thoroughly drained, gritty, peaty loam, are excellent subjects for the bog or water gardens. *Culture.*—Plant in October in groups of five to seven, 4 to 5 inches deep (about three times their own depth), and from 6 to 12 inches apart, according to species. The bulbs should, as a rule, when planted, rest on sand, and they should not be disturbed oftener than every three years. A yearly top-dressing of well-decayed manure each spring will be beneficial, and when growing shade should be afforded the lower parts of the stems by means of small shrubs or other plants planted in proximity to them. When in bloom the plants must be carefully staked. All dead flowers should at once be picked off, but the stems must not be cut down until they have died off. Propagation is carried out by means of offsets in October, by planting scales from the bulbs in sandy soil in a cold frame, or by means of seeds sown in August in pans in a cold frame. But seedlings of most species do not flower until they are three to five years old. *Species.*—*L. auratum* (White, Yellow, and Crimson, August–September, 40 in.) ; *L. Browni* (White and Chocolate, June–July, 30 in.) ; *L. bulbiferum* (Orange, Yellow, and Red, June, 15 in.) ; *L. canadense* (Scarlet or Yellow with Purple Spots, July, 40 in.) ; *L. carniolicum* (Scarlet with Black Spots, July, 30 in.); *L. chalcedonicum* (Bright Scarlet, July–August, 40 in.); *L. giganteum* (White, striped Purple, July-August, 100–150 in.); *L. japonicum* [syn. *Krameri*] (Pink, July–August, 30 in.); *L. pardulinum* (Scarlet, Orange, and Yellow, spotted with Purple, July, 60 in.); and *L. superbum* (Scarlet and Yellow, dotted Purple, July–August, 24–84 in.)

Limnanthemum nymphæoides (Fringed Golden Buck Bean).—Beautiful floating aquatic plants, hardy by nature, and carrying yellow or yellow and white flowers in July and August. They should be given a sunny position in slow-moving, shallow water. *Culture.*—Sow seed, or propagate by division of roots in March, and plant, with not more than 12 inches of water above the crowns.

Limnanthes.—Dwarf hardy annuals, which grow from 3 to 6 inches in height, and in summer carry fragrant white, pink, or white and yellow flowers. They love a gritty loam and are useful for edgings or for the rock garden. Once well established they will be rather a pleasing nuisance, sowing themselves in every spare corner in the garden. *Culture.*—Sow seed thinly in spring or autumn and thin out as soon as the young plants are fit to handle.

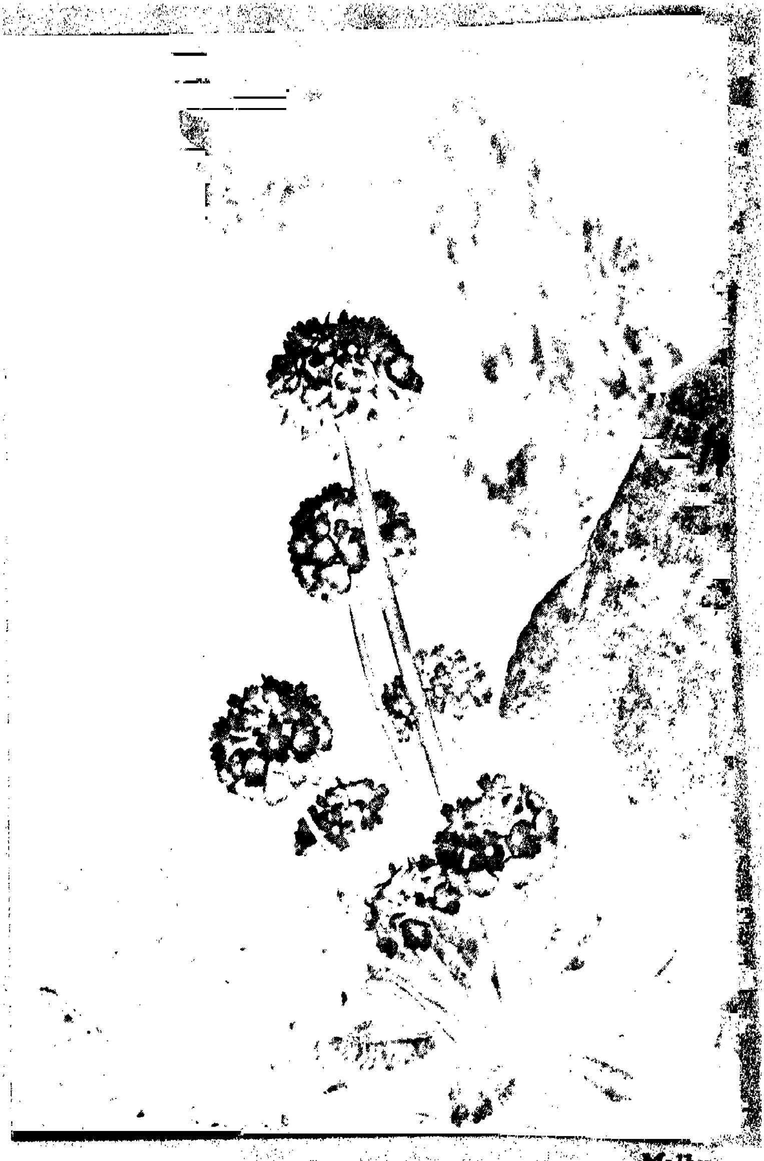
Linaria (Toad Flax).—*L. vulgaris*, or the Common Toad Flax, is indigenous to Britain, and is often found as a trailer on old walls. It has a pretty, round, indented leaf and a lilac and yellow flower, resembling that of an antirrhinum or snapdragon in shape, only very much smaller. The rock garden species, which are dwarf-growing perennials, need a gritty and rather poor soil. They should be given a semi-shaded position, and may be used for carpeting, for walls, or for growing in the moraine or scree garden. *Culture.*—Sow seed under glass as soon as ripe or in March, or in the open in April, or propagate by means of division of roots in the spring or autumn. *Species.*—*L. alpina* (Violet, blotched Orange, 3 in.); *L. cymbalaria* (Mauve and Orange, Trailer); *L. pallida* (Purple, 4 in.). All flower from June to September.

Linnæa (Twin-flower).—These are hardy evergreen shrubs of dwarf and trailing habit, which thrive in a mixture of sand and peat and on moist, shady banks in the bog garden. In June and July they carry their fragrant, gloxinia-like flowers in pairs on short wiry stems. *L. borealis*, with tiny rose and white, bell-shaped flowers and growing about 3 inches high, is the only species much grown. *Culture.*—Propagate by means of division of roots in March or October, or increase by layering.

Linum (Flax or Linseed-oil Plant).—The rock garden species of this genus, which are useful for edging, walls, and ledges, are hardy herbaceous perennials growing from 4 to 12 inches in height and flowering from May to September. They are easily grown and like a sunny position and a dry, light, sandy soil with the addition of ample grit. *Culture.*—Sow seed under glass as soon as ripe or in March, or in the open in April, or take cuttings and strike in sandy soil in July. Plant out in permanent position in April or October. *Species.*—*L. alpinum* (Blue, 6–9 in.) ; *L. flavum* (Golden-yellow, 10 in.) ; *L. hirsutum* (Reddish-pink, 9 in) ; *L. narbonense* (Deep Blue, 12–24 in.) ; and *L. salsoloides* (Pink, 9 in.).

Lippia nodiflora. This is a dwarf-growing perennial about 6 inches high and carrying white, pink, or purple flowers from May to September. It does best in the sun and in gritty loam. *Lippia nodiflora* makes an excellent subject for the wall or paved garden. Propagate by means of division of roots in March.

Lithospermum (Gromwell).—Hardy evergreen perennial shrubs of trailing habit with small, hairy leaves and masses of azure-blue flowers. They do well in a well-drained mixture of gritty loam and peat, and in moderately sunny positions. The lithospermums flower from June to September, and are very effective on dry walls, for carpeting, and for crevices in the rock garden. *L. prostratum* (var. *Heavenly Blue*) is a most beautiful prostrate shrubby plant



Malby

PRIMULA DENTICULATA

with dark green, evergreen foliage; it puts forth a profusion of gentian-blue flowers from May to September. It rarely grows higher than 6 inches, and dislikes lime. *L. Gastonii,* another excellent rock garden plant with blue flowers, thrives on the moraine, and needs ample lime in its soil. *Culture.*—Sow seed under glass as soon as ripe or in March, take cuttings (2½ inches long) in September and strike in sandy soil under glass, or propagate by means of layering in September or by division of roots in April or September. Plant out in permanent position in spring or autumn. Other good species are *L. graminifolium* (Sky Blue); *L. intermedium* (Deep Blue); and *L. petræum* (Blue and Pink).

Lobelia.—A genus of pretty profusely blooming annuals and perennials, of which the low-growing kinds are suitable for edging, thriving in deep, well-manured and moist soil, and in sunny positions. The tall hardy perennial species are valuable subjects for cultivation in the bog or marsh garden. *Culture.*—Sow seed in a frame in April, take cuttings of young growths in March, or propagate by means of division of roots in late April, and plant out 8 to 9 inches apart in permanent position in rich, moist soil to which a dusting of bonemeal has been added. Water liberally while the plants are making growth. As soon as the foliage is dead in autumn, the stems are cut down and the roots lifted and stored in boxes of dry soil in a frost-proof frame. Water is given in March to re-start growth, and late in April the roots are divided and planted-out. *Species.*—*L. cardinalis* (Crimson-scarlet, 24–36 in.); *L. fulgens* (Scarlet, 30 in.); *L. radicans* (Lilac, Trailing); *L. syphilitica* (Blue and White, 24–30 in.); all flower from June to September. *Named Varieties.*—*Kimbridge* (Magenta); *B. Ladhams* (Scarlet); *Queen Victoria* (Red); *Purple Emperor*; and *Salmon Queen.*

Loiseleuria procumbens [syn. *decumbens.*] (Trailing Azalea).—This is an attractive and valuable little shrubby plant of trailing habit. It has purple-pink flowers in summer, and is a valuable subject for moist situations in the rock garden, thriving in sandy peat and leaf-mould. Propagation is best carried out by means of cuttings in a frame in September.

Lomaria (Deer Fern).—*L. alpina* (Alpine Hard Fern) is a hardy dwarf species of this genus, growing from 4 to 8 inches high, and loving the shade and a warm, sheltered nook in the rock garden. If possible, it should have sandy peat and loam, with the addition of ample limestone chippings. *L. spicant* (10 in.) is also hardy and will thrive if treated in the same way. *Culture.*—Plant in April. Propagate by means of spores under glass in July, or by division of roots in April. *See also* Blechnum.

Lonicera (Honeysuckle).—This genus comprises all the trailing and climbing plants known as Honeysuckles. Some of these are evergreen, others are deciduous; many are hardy, but several are only half-hardy. They thrive in any good, moderately dry garden soil and frequently in shaded positions. *Culture.*—Strike cuttings of ripe shoots in the open in late summer; let the cuttings stand in the bed for a year, then plant out from October to April. If preferred, propagate by layering or from seed. After flowering cut away old wood, and trim back straggling shoots. For garden use *L. Periclymenum belgica* and *L. P. serotina*, the early and late Dutch Honeysuckles, are excellent. *L. fragrantissima* (Bush Honeysuckle) flowers early in February, and is a species useful in the rock garden.

Lotus (Bird's Foot Trefoil).—The hardy perennial species of this genus, which grow well in ordinary soil, are eminently suited for ornamenting dry banks, for crevices in paving, or for sunny ledges in the rock garden. They have fine silvery-grey foliage and carry masses of pea-like flowers of various colours. *Culture.*—Sow seed under glass as soon as ripe or in March, or propagate by means of division of roots in April. They require no protection in winter. *Species.*—

L. corniculatus (Yellow, July–Aug., 6 in.) ; *L. Bertholetii* [syn. *peliorhynchus*] (Scarlet, June, 10 in.) ; *L. Tetragonolobus* (Purple, July–Sept., 6–12 in.).

Luzula (Wood Rush or Cuckoo Grass).—This is a genus of rush-like plants sometimes useful for growing in the water garden at the moist edges of ponds and streams. They are, as a rule, propagated by means of division of roots in April.

Lychnis (Campion).—This genus comprises hardy annuals, biennials, and perennials. Some two or three species are dwarf-growing and suitable for cultivation on walls or in crevices in the rock garden. These like a sunny position and a gritty loam. Our own alpine *L. alpina* is one of the prettiest. Above dense little tufts of foliage like that of the armeria it throws up heads of charming rose-coloured flowers on stems some 4 inches in height. *Culture.*—Sow seed under glass as soon as ripe or in March, transplant the seedlings as soon as they are fit to handle, harden off and plant out in October or April. Protect from excessive damp by means of a sheet of glass in winter. *Species.*—*L. alpina* (Rose, April–June, 4 in.) ; *L. Lagascæ* (Rose and White, June and July, 4 in.), which likes a position on the moraine ; and *L. pyrenaica* (White, June and July, 6 in.). *L. fulgens grandiflora* (Salmon, June–Sept., 12 in.), and *L. Haageana* (Crimson, July–Aug., 12 in.), which are, strictly speaking, border plants, are also sometimes grown in the rock garden.

Lysimachia (Creeping Jenny, Moneywort, or Loosestrife).—These herbaceous perennials do best in moist, rich, ordinary soil, and in semi-shade. The low-growing species make excellent subjects for carpeting in the rock garden, where they flower from June to September; the taller kinds are useful for the bog and marsh garden. *Culture.*—Propagate by means of division of roots in April or October, and plant out in permanent position at that time. No protection is required during winter. *Species.*—(*Tall*)—*L. ciliata* [syn.

Steironema ciliatum] (Yellow, 30 in.); and *L. clethroides* (White, 30 in.). (*Dwarf*)—*L. nummularia aurea* [Creeping Jenny] (Yellow, Trailer); *L. nemorum* (Yellow Pimpernel).

Lythrum (Purple Loosestrife).—A genus of tall-growing hardy perennials, in appearance very like the Epilobiums. They will thrive in the shade in rich, sandy soil in the bog or marsh garden, and will flower from June to September. *Culture.*—Sow seed in the open in April or propagate by means of division of roots in March, and plant out in permanent position. *Species.*—*L. atropurpureum* (Deep Purple, 40 in.); *L. Salicaria* (Purple and Rose, 50 in.); and *L. virgatum* [*Rose Queen*] (Rose, 40 in.).

Magnolia.—The genus Magnolia comprises hardy and half-hardy, deciduous and evergreen shrubs, to which a good, deep, well-drained loam with ample leaf-mould and a sunny position are essential. They should be transplanted as little as possible, and should be pruned when required (which is but rarely) in summer. *H. stellata*, a hardy, dwarf-growing species (3–6 ft.) with beautiful delicate pink or white flowers, in shape much like a wine-glass, in March, makes a very attractive addition to the rock garden. A fairly sheltered site is, however, desirable. *Culture.*—Plant in March, April, October, or November; propagate by means of grafting under glass in spring.

Maianthemum (Twin-leaved Lily of the Valley).—Beautiful little hardy perennials with heart-shaped leaves that are carried in pairs. They may be effectively employed for carpeting in the rock garden, and like a mixture of moist loam and leaf-mould, also a shady position. *Culture.*—Propagate by means of division of roots in April or September, and plant out in permanent position at either of those times. No protection is necessary in winter. *M. bifolium* (5 in.), with white flowers like those of a small spiræa in June, is a good species.

Malva sylvestris (Marsh Mallow).—This is a very attractive, tall-growing shrubby perennial, which from July to September bears beautiful mauve-pink flowers much like a single hollyhock. Its home is in the bog or marsh garden, and it is especially suitable for growing near the sea. *Culture.*—Sow seed in the open in April, take cuttings in August, or propagate by means of root division in March or October.

Mazus.—A genus of hardy herbaceous perennials of creeping habit and flowering in summer. Because of their masses of intertwined roots and small fern-like leaves, they are excellent subjects for carpeting in the paved garden, or for setting in crevices in the rock garden. They thrive in sunny positions in a mixture of well-drained, gritty loam and leaf-mould, but need ample water in summer. *Culture.*—Propagate by means of division of roots from April to September, and plant out in permanent position. No protection is necessary in winter. *Species.—M. Pumilio* (Purple-mauve) and *M. reptans* (Mauve).

Meconopsis.—The best of this popular genus are hardy herbaceous perennials or biennials. They should be planted in partial shade, and all, except *M. latifolia,* like a moist root-run. These plants cannot stand a hot, dry atmosphere ; it must be humid. They are quite hardy and need a rich, gritty, and deep loam with the addition of a little peat, if possible. In most cases they have thick, hairy leaves and upright flower-spikes like those of a foxglove, only the flowers are very large, poppy-like, and of the most exquisite shades. The dwarfer-growing species make most attractive and graceful inmates for the rock garden. *M. cambrica* (12 inches), with orange flowers, should not be forgotten for the wall garden. *M. aculeata* and *M. punicea* (Himalayan Poppy) are also well worthy of cultivation in the Alpine House, *see* p. 44. *Culture.*—Sow seed in the open in April, or under glass in February or March, thin out, harden off, and plant out in groups of five or six in May. They may also be increased by means of division of roots in March. Nearly all seed freely and furnish ample young plants. *Species.*—(*Biennials*)—*M. integrifolia* (Yellow); *M. latifolia* (Cambridge Blue); *M. Prattii* (Bluish-purple); *M. punicea* (Red); *M. racemosa* (Blue); and *M. simplicifolia* [Bailey's] (Sky Blue). (*Perennials*)—*M. aculeata* (Blue); and M. *Delavayi* (Deep Purple-blue). All flower from May to August and grow 1 to 5 feet high.

Mentha (Mint).—A large genus of hardy herbaceous perennials, which includes several useful little plants of very dwarf nature. These will thrive in crevices in the paved or rock garden. One of the best is *M. Requienii*, with its pretty little lilac flowers in the summer and minute foliage like that of the *Arenaria balearica.* Once disturbed it will fill the air with its delightful fragrance. The mints require a shady site and a moist, gritty loam. Propagation is best carried out by means of division of roots in March.

Menyanthes trifoliata (Bog Bean).—This is a hardy perennial, which thrives in ordinary soil and loves a sunny position in a bog or in still, shallow water. It grows to a height of about 12 inches, and the pink and white flowers are borne from March to June. *Culture.*—Strike cuttings in mud in summer; plant out in March with from 6 to 12 inches of water above the crowns.

Mertensia (Lungwort).—These are very beautiful hardy perennials, which grow well in almost any moist, cool soil with a little peat in it. They need shady positions. The rock garden species, which grow from 4 to 9 inches high and flower in June and July, require the addition of a quantity of grit to the soil. *M. pulchellum* is a suitable species for cultivation in the Alpine House, *see* p. 44. *M. primuloides* is an admirable plant for the moraine or wall garden. *Culture.*—Propagate by means of division of roots in April or September, preferably in April. All clumps should be lifted and divided triennially. *Species.*—*M. echioides* (Blue, with Yellow Eye); *M. elongata* (Pale Blue); *M. primuloides* (Bluish-purple, Yellow Eye); and *M. pulmonarioides* (Purplish-blue, Yellow Eye).

Mimulus (Musk or Monkey Flower).—A genus of handsome and profusely-flowering hardy and half-hardy annuals and hardy perennials with singularly-shaped and brilliantly-coloured flowers, distinguished by their rich and strikingly beautiful markings. The annuals are useful for bedding or for growing in the greenhouse. The perennials are useful in the bog or marsh garden. They like a shady site, and a moist, rich soil; nothing suits them better than a bank at the edge of a stream. *M. luteus*, especially, makes an excellent plant for the marsh or water garden, while *M. radicans*, a creeping sort, is equally valuable for the paved garden. The smaller species are much used for carpeting in the paved garden and for the rock garden. *Culture.*—Sow seed under glass as soon as ripe or from February to March, or in the open in April, or propagate by means of division of roots in March. Cuttings can be taken in summer. In cold localities where the winters are severe, it is wiser to lift the roots in October and store them in a frost-proof frame for the winter. *Species.*—*M. Burneti* (Pale Brown); *M. cardinalis* (Scarlet, 24 in.); *M. cupreus* (Orange, 12 in.); *M. luteus* (Yellow, Spotted, 9 in.); *M. moschatus* (Yellow, 6 in.); *M. radicans* (White and Violet, 3 in.); and *M. ringens* (Pale Blue, 10 in.). All flower from June to August.

Miscanthus japonicus (Striped Zebra Rush).—This is a hardy plant that can be used with great effect in the bog or marsh garden. It thrives in the sun, and should be planted on banks in any ordinary soil. It grows to about 40 inches high, and flowers from June to September. Another good species is *M. saccharifer*, which attains a height of from 7 to 8 feet and is very similar to the Bamboos. *Culture.*—Propagate by means of division of roots in April, and plant out in permanent position at that time.

Mitraria (Mitre Flower).—These are half-hardy evergreen climbing shrubs with bright, glossy green leaves and pendant trumpet-like flowers. They will grow outdoors in mild localities in warm, semi-shaded, and sheltered situations, and are ideal for the bog or marsh garden. *Culture.*—Plant in April in a moist, peaty soil. To propagate, strike cuttings of young shoots in a frame in summer. *M. coccinea* (3 to 5 ft.), with orange-scarlet flowers from May to July, is the best-known species.

Morina (Whorl-flower).—This is a genus of half-hardy and hardy herbaceous perennials, some of which make excellent subjects for the rock garden. These plants like a warm, sunny position and a rich, gritty loam ; in exposed districts it is better to winter them in a frame. Sow in March, or propagate by offsets. *Species.*—*M. longifolia* (Rose-purple) and *M. persica* (Red and White). Both flower from July to August, and grow to a height of about 30 inches.

Morisia hypogœa (Mediterranean Cress).—This is a hardy little rock plant, which thrives in a well-drained, deep, gritty loam, and in a sheltered and fairly sunny spot on the moraine, in walls, in crevices in paving, or on rocky ledges. It is also a good plant for the Alpine House, *see* p. 44. The leaves form small rosettes of shiny, deep green foliage ; the flower stems are only 2 to 3 inches in height, and in April and May carry golden-yellow flowers. *Culture.*—Sow seed under glass as soon as ripe or in March, take cuttings and strike in sandy soil under glass or propagate by means of division of roots in March or October, and plant out in permanent position. No protection is necessary in winter. This charming little plant should certainly be tried, as it is very easily grown.

Muscari (Grape Hyacinth).—These are hardy bulbous plants with masses of tiny, bright blue flowers arranged in clusters, like grapes, on small erect stems. They thrive in good loam and in warm, sunny situations, making excellent inmates for the rock garden. *Culture.*—Plant in September or October from 2 to 3 inches deep and 3 inches apart ; lift the bulbs from the ground only when overcrowded.

Propagate by means of offsets in October. *Species.*—(*Early*)—*M. azureum* [syn. *Hyacinthus azureus*] (Light Blue Feb.–March, 4 in.) and *M. botryoides alba* (White, Feb.-March, 6 in.). (*Late*)—*M. conicum* (Sky Blue, April–May 8 in.) and *M. racemosum* (Deep Blue, April–May, 6 in.).

Myosotis.—*See* Forget-me-not.

Narcissus.—The genus narcissus includes many beautifu hardy bulbs, most species of which are excellent for introduction into the rock garden. The majority thrive in well dug and well-drained ordinary soil, though some few notably the *Hooped Petticoat*, the *Cyclamen-flowered*, an the *Angel's Tears*, prefer warm, deep, and moist sand loam; the *Polyanthus Narcissi* like a rather stiff soi Partial shade is desirable, but they will grow well in fu sun. *Culture.*—Plant from August to October, the soon the better, 4 inches deep in heavy soil and 7 inches belo the surface in light soil, and about 4 inches apart, makir exception of small species, which should be 2 to 3 inch deep, and the May-flowering Double White Narcissu which must be not less than 6 inches deep in well-work moist loam. If used for naturalizing, the bulbs should l left in the ground, but in beds or borders they should l raised triennially in July. Do not cut down the "grass until it is quite yellow and lying prone on the ground. unsightly the bulbs may, of course, be transplanted aft flowering to another site to allow this natural dying do of the "grass." Once lifted the bulbs should be spre out to dry, and when this has been effected, the lea and dead roots may be removed, the bulbs then being stor in a cool, dry place. Propagate by means of offsets lifting time, re-planting the offsets immediately in a reser garden; seeds may also be sown in pans or boxes in Augu but they take from four to six years to flower. *See a* chapter on Bulb Growing. *Named Varieties.*—TRUMI (Trumpet as long or longer than the perianth segments (White) *Peter Barr*; (Yellow) *Golden Spur*; (Bi-colo white or cream perianth with yellow trumpet)—*Horsfieldii.* SHORT CUP or INCOMPARABILIS (Cup not less than one-third but less than equal to the length of the perianth segments; outer petals yellow or white, cup yellow or red)—*Lucifer, Sir Watkin,* and *Vesuvius.* BARRI (Cup less than one-third the length of the perianth segments; bright coloured cups, perianths yellow or white)—*Albatross, Conspicuous,* and *Seagull.* LEEDSII or EUCHARIS-FLOWERED (Outer petals white, with white or pale yellow or cream cups, sometimes tinged pink)—*Bridesmaid, Duchess of Westminster,* and *White Lady.* TRIANDRUS or "ANGEL'S TEARS" (Short cup and reflexed outer petals)—*Agnes Harvey, Queen of Spain,* and *Venetia.* CYCLAMEN-FLOWERED (Pale yellow with darker and very narrow trumpet)—*Cyclamineus.* JONQUIL-FLOWERED—*Buttercup, Jonquilla,* and *Odorus rugulosus.* TAZETTA or POLYANTHUS (These are all bunch-flowered and white with yellow cups)—*Aspasia, Elvira,* and *Paper White.* POETICUS or POET'S (Petals white or yellow with red eye)—*Cassandra, Epic, White Standard,* and *Pheasant's Eye.* DOUBLE—*Argent, Butter and Eggs,* and *Telamonius plenus.*

Nemesia.—Half-hardy annuals, which bloom from June to September. The dwarf species, growing about 9 inches high, make very charming subjects for introduction into the rock garden. *Culture.*—Sow seed thinly under glass as soon as ripe or in March (60° F.), covering it sparsely with sieved sandy loam and leaf-mould. Thin out the seedlings as soon as possible, harden off in a cold frame, and plant out 4 to 6 inches apart in May. *Species.*—*N. strumosa* (Red, Pink, Orange, Yellow, Blue, and White) and *N. versicolor* (White and Mauve). *Named Varieties.*—*Aurora* (Red and White); *Blue Gem*; *Cherry Red*; *Orange Prince*; and *Twilight* (Mauve and White).

Nemophila (Californian Bluebell).—This is one of the most charming and generally useful of all dwarf-growing hardy annuals. All species have a neat, compact, and uniform habit of growth, and the colour of the flowers is very beautiful. They are very hardy and grow from 3 to 9 inches high, flowering from July to September, and making excellent subjects for carpeting in the rock garden *Culture.*—Sow seed thinly in light soil from March to June covering it just lightly with soil, and thin out the seedling to about 8 inches apart when fit to handle. Any good garden soil suits them, so does a sunny position, provided sufficient moisture is available in hot weather. A mulching of well-rotted and sieved manure will help them in summer *Species.*—*N. insignis* (Sky-blue, White Centre); *N. Men ziesii* (Purple, Blue, White, blotched Black); and *N. Men ziesii var. discoidalis* (Maroon and White).

Nepeta (Catmint).—Hardy perennials, which should b given sunny positions and ordinary soil. They are valuab plants for introduction into the wall or rock garden. The grow from 12 to 18 inches high, have greyish foliage, an flower from May to September. *Culture.*—Propagate b means of division of roots in spring or autumn. Layerin may also be effected, or cuttings, 3 to 4 inches long, of th creeping stems can be struck in August, wintered in a fram and planted out in April. No winter protection is necessa for matured plants. *Species.*—*N. Mussinii* and *N. curviflo* (both Blue).

Nephrodium (Male Fern, Buckler Fern, Hay-scent Fern).—A large genus of greenhouse and hardy ferns, som species deciduous, others evergreen, which grow from 10 50 inches high, according to species. The hardy sorts gro well in a compost of sandy loam and leaf-mould and partial sun or shade, and are excellent subjects for the ro garden. *Culture.*—Plant in March. Propagate by mea of spores sown under glass in July. *See also* Ferns, p. 6

Nertera depressa (Coral-berried Duckweed).—This i dwarf-growing plant, rarely exceeding 5 inches in heig that creeps along the surface of the ground and roots it runs. It carries a quantity of small, green, ovate lea white or cream perianth with yellow trumpet)—*Horsfieldii.* SHORT CUP or INCOMPARABILIS (Cup not less than one-third but less than equal to the length of the perianth segments; outer petals yellow or white, cup yellow or red)—*Lucifer, Sir Watkin,* and *Vesuvius.* BARRI (Cup less than one-third the length of the perianth segments; bright coloured cups, perianths yellow or white)—*Albatross, Conspicuous,* and *Seagull.* LEEDSII or EUCHARIS-FLOWERED (Outer petals white, with white or pale yellow or cream cups, sometimes tinged pink)—*Bridesmaid, Duchess of Westminster,* and *White Lady.* TRIANDRUS or "ANGEL'S TEARS" (Short cup and reflexed outer petals)—*Agnes Harvey, Queen of Spain,* and *Venetia.* CYCLAMEN-FLOWERED (Pale yellow with darker and very narrow trumpet)—*Cyclamineus.* JONQUIL-FLOWERED—*Buttercup, Jonquilla,* and *Odorus rugulosus.* TAZETTA or POLYANTHUS (These are all bunch-flowered and white with yellow cups)—*Aspasia, Elvira,* and *Paper White.* POETICUS or POET'S (Petals white or yellow with red eye)—*Cassandra, Epic, White Standard,* and *Pheasant's Eye.* DOUBLE—*Argent, Butter and Eggs,* and *Telamonius plenus.*

Nemesia.—Half-hardy annuals, which bloom from June to September. The dwarf species, growing about 9 inches high, make very charming subjects for introduction into the rock garden. *Culture.*—Sow seed thinly under glass as soon as ripe or in March (60° F.), covering it sparsely with sieved sandy loam and leaf-mould. Thin out the seedlings as soon as possible, harden off in a cold frame, and plant out 4 to 6 inches apart in May. *Species.*—*N. strumosa* (Red, Pink, Orange, Yellow, Blue, and White) and *N. versicolor* (White and Mauve). *Named Varieties.*—*Aurora* (Red and White); *Blue Gem*; *Cherry Red*; *Orange Prince*; and *Twilight* (Mauve and White).

Nemophila (Californian Bluebell).—This is one of the most charming and generally useful of all dwarf-growing hardy annuals. All species have a neat, compact, and uniform habit of growth, and the colour of the flowers is very beautiful. They are very hardy and grow from 3 to 9 inches high, flowering from July to September, and making excellent subjects for carpeting in the rock garden. *Culture.*—Sow seed thinly in light soil from March to June, covering it just lightly with soil, and thin out the seedlings to about 8 inches apart when fit to handle. Any good garden soil suits them, so does a sunny position, provided sufficient moisture is available in hot weather. A mulching of well-rotted and sieved manure will help them in summer. *Species.*—*N. insignis* (Sky-blue, White Centre); *N. Menziesii* (Purple, Blue, White, blotched Black); and *N. Menziesii var. discoidalis* (Maroon and White).

Nepeta (Catmint).—Hardy perennials, which should be given sunny positions and ordinary soil. They are valuable plants for introduction into the wall or rock garden. They grow from 12 to 18 inches high, have greyish foliage, and flower from May to September. *Culture.*—Propagate by means of division of roots in spring or autumn. Layering may also be effected, or cuttings, 3 to 4 inches long, of the creeping stems can be struck in August, wintered in a frame and planted out in April. No winter protection is necessary for matured plants. *Species.*—*N. Mussinii* and *N. curviflora* (both Blue).

Nephrodium (Male Fern, Buckler Fern, Hay-scented Fern).—A large genus of greenhouse and hardy ferns, some species deciduous, others evergreen, which grow from 10 to 50 inches high, according to species. The hardy sorts grow well in a compost of sandy loam and leaf-mould and in partial sun or shade, and are excellent subjects for the rock garden. *Culture.*—Plant in March. Propagate by means of spores sown under glass in July. *See also* Ferns, p. 69.

Nertera depressa (Coral-berried Duckweed).—This is a dwarf-growing plant, rarely exceeding 5 inches in height, that creeps along the surface of the ground and roots as it runs. It carries a quantity of small, green, ovate leaves and tiny, greenish flowers followed by orange-scarlet berries, and is well worthy of a place in the rock garden. *N. depressa* thrives in the shade and in warm, moist, sandy loam and leaf-mould, but must be taken inside in winter. *Culture.*—Sow seed in heat as soon as ripe or in March or April, or propagate by means of division of roots in spring.

Nierembergia (Cup Flower).—Half-hardy perennials, which thrive in moist, rich loam, and in a sunny position. *N. rivularis* grows about 3 inches high and carries from June to August creamy-white, cup-shaped flowers streaked with purple. Its glossy green leaves form a flat cluster and it makes a useful little plant for carpeting or for growing on a ledge in the rock garden. It may also be grown with advantage in the Alpine House, *see* p. 44. *Culture.*—Sow seed under glass as soon as ripe or in March, or take cuttings in August and strike in sandy soil under glass. Plant out in spring or early autumn. No protection is necessary in winter.

Nolana (Chilian Bell-flower).—The nolana is a pretty little hardy annual of trailing habit with velvety, bell-shaped flowers of blue or blue and white. They grow from 3 to 12 inches high, and are extremely valuable subjects for inclusion in the rock garden. Sow seed in March in light, gritty loam, and leaf-mould, and thin out the seedlings to 6 inches apart as soon as possible.

Nuphar.—A genus numbering but a few species, among which is *N. luteum,* the Yellow Water Lily. This lily is hardy and, like all of its kind, may be grown with success either in a pond or in a slow-moving stream. The plant spreads over the surface of water and flowers from June to August. It likes plenty of sun. *Culture.*—Sow seed in rich soil in a basket and sink it in the water in winter, or propagate by means of division of the roots in April. Plant from April to June in good loam, leaf-mould, and cow-dung in weighted openwork baskets ; when planted there should be about fifteen inches of water above the crowns. The roots will soon find their way outside the basket and will make fresh growth around it. *Species.*—*N. advena* and *N. luteum.* Both carry yellow flowers and grow from 12 to 18 inches high. *See also* the chapter on The Water Garden.

Nymphæa.—This is a genus of water-lilies, whose species may be grown and managed in the same way as *Nuphar luteum.* The hardy outdoor species have white, rose, orange, or yellow flowers, and among them is the common White Water Lily indigenous to Britain. Most species like a sunny, sheltered position in slow-moving water; those from hot countries require a hothouse. *Culture.*—Sow seed in spring ¼ inch deep in rich loam in a basket under water, or propagate by means of division of roots at any time between April and June and plant in rich loam, leaf-mould, and cow-dung in weighted openwork baskets sunk so that there is from 12 to 60 inches of water above the crowns, according to species. *See also* the chapter on The Water Garden, and for the best species and varieties, list, p. 132.

Œnothera (Evening Primrose).—A genus of beautiful plants, annuals, biennials, and perennials, with large godetia-like flowers. Some of the dwarf-growing perennial species are suitable for the wall or rock garden. All thrive in rich, sandy loam, or in any good soil, and need sunny positions. *Œ. pumila* (Golden-yellow, July, 6 in.) is a suitable species for cultivation in the Alpine House, *see* p. 44; and *Œ. rosea* (Pink, June–Sept., 5 in.) may be grown in the paved garden. *Culture.*—Sow seed under glass as soon as ripe or in March, harden off the seedlings, and plant them out in their flowering position in May. *Species.*—*Œ. acaulis* (White, tinted Rose, 9 in.); *Œ. cæspitosa* (White, tinted Rose, 9 in.); *Œ. missouriensis* (Yellow, 8 in.); *Œ. pumila* (Golden-yellow, 6 in.); and *Œ. rosea* (Pink, 5 in.). All flower from June to October.

Olearia (New Zealand Daisy Bush).—This is a genus of hardy evergreen shrubs, which reach a height of from 4 to 9 feet and carry clusters of white, daisy-like flowers in late summer. They like a shady position and a well-drained soil, and are well worthy of inclusion in a selection of shrubs for the rock garden. For this purpose *O. myrsinoides* is especially good. *Culture.*—Plant in May or October. Trim the bushes to shape when necessary in March, and every four or five years cut them hard back. To propagate, sow seed in a frame in March, or strike cuttings in a frame in September.

Omphalodes (Creeping or Rock Forget-me-not, Navelwort).—Beautiful hardy annual and perennial creeping and tufted plants, which grow from 4 to 12 inches high, make a dense carpet of pale green leaves, and carry forget-me-not-like flowers in the spring, summer, and early autumn. They like a semi-shaded, sheltered site in the rock garden, and love a moist, sandy, or gritty loam. *O. linifolia* is a dainty little hardy annual with greyish foliage and in July has white flowers on stems some 9 inches in height. *Culture.*—(*Annuals*)—Sow seed in the open in March, and thin out the seedlings when fit to handle. (*Perennials*)—Sow seed under glass as soon as ripe or in March, or propagate by means of division of roots in April. No protection is necessary in winter, but slugs will do much damage unless kept in check. *Species.*—(*Annuals*)—*O. linifolia* (White, July, 9 in.) and *O. cappadocica* (Porcelain Blue [White Eye] May–June, 9 in.). (*Perennials*)—*O. Luciliæ* (Lilac-blue, June-Sept., 9 in.) and *O. verna* (Porcelain Blue, April-May, 4 in.).

Onoclea sensibilis (Sensitive Fern).—This is a hardy, deciduous fern that grows from 10 to 15 inches high and thrives in sandy loam and leaf-mould in a cool, moist site in the rock or bog garden. *Culture.*—Plant in March. Propagate by means of offsets in March, or raise from spores sown under glass in July. *See also* Ferns, p. 69.

Ononis (Rest Harrow).—Hardy shrubby perennials, the dwarf-growing species of which, such as *O. rotundifolia* (Pink, July–Sept., 18 in.) and *O. spinosa* (Rose-purple, July–Sept., 10 in.), thrive in sunny situations in the rock garden, and in almost any light soil. The flowers are in shape like those of the pea. *Culture.*—Sow seed under glass as soon as ripe or in March, take cuttings in September and strike in sandy soil under glass, or divide the roots in March. Plant out in March or early autumn in their flowering positions. No protection is necessary in winter.

Onosma (Alpine Comfrey).—A large and showy genus of hardy perennial rock plants, which grow well on hot, sunny ledges or walls and in dry, well-drained, gritty loam to which peat and sand have been added. They hate damp situations and should be protected by means of a sheet of glass in winter. The onosmas grow from 4 to 10 inches high, and in June and July carry tubular flowers in bunches on short nodding stems above very hairy, silvery-grey foliage. *Species.*—*O. albo-roseum* (White, tinged Rose); *O. cæspitosum* (Orange); *O. frutescens* (Lavender); *O. sericeum* (Creamy-yellow, May–June, 6–8 in.); and *O. tauricum* (Lemon-yellow).

Orchids (Hardy).—Many people still look upon orchids as plants that can only be grown by those who possess large hot-houses and plenty of money. This is, luckily, quite a misconception, for there are, besides those orchids that may be kept in the cool house, very many beautiful hardy and easily-grown species, that may be used to beautify the low-lying parts of the rock garden, or the bog garden. They certainly should not be overlooked, for they are lovely and very interesting plants, and what is more, in most cases, give but little trouble. Their colours range from purple through mauve, pink, brown, yellow, green, to white, and the greater number of them flower between May and September, and grow best in moist, peaty loam and sand. Partial shade is preferred by most of them, and they should be planted in March and April, or in September and October when they have finished flowering. Most orchids are propagated by division of roots at the time of planting.

The following list, which only gives a few of the more easily-grown and most interesting species, shows the conditions, both as to soil and aspect, most favourable to each kind, together with other cultural details.

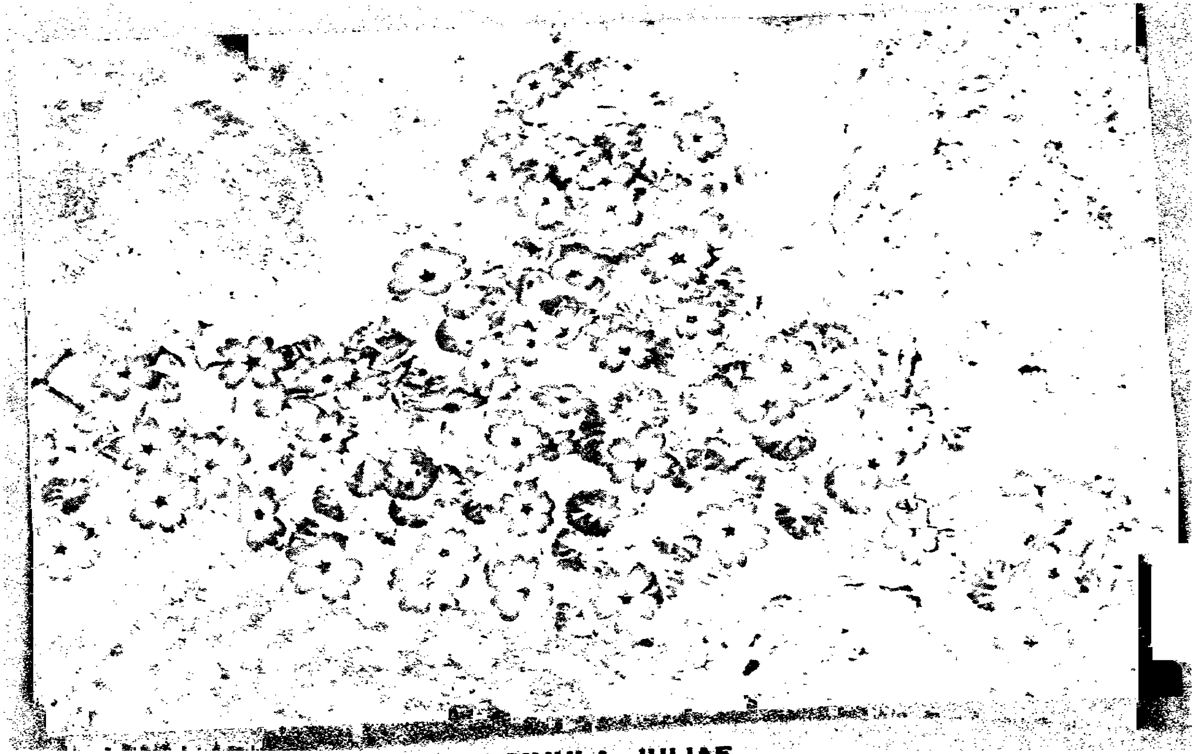
Calopogon pulchellus (Grass Pink Orchis).—This grows to a height of 18 inches, has purple or yellow flowers in June and July, and likes an open but semi-shaded site in the rock garden and moist and peaty soil. Plant in March.

Calypso borealis (Calypso Orchis).—Only 5 inches in height, this orchid bears pink and yellow flowers in June and July, and likes a semi-shaded site in the bog or rock garden and peaty leaf-mould and sand. Plant in March.

Cephalanthera alba (White Helleborine).—This grows to a height of 9 inches and has white flowers. Plant in March or September in a shady situation in moist, peaty leaf-mould and sand.

Cypripedium humile (Lady's Slipper).—This grows to a height of 6 inches and has rose and purple flowers. Other hardy cypripediums are: *C. Calceolus* (15 in., Brown and Yellow); *C. californicum* (12–24 in., Yellow and White); *C. candidum* (10 in., White and Greenish-brown); *C. japonicum* (6–12 in., Pink, White and Green); *C. macranthon* (9–12 in., Rosy-purple); *C. montanum* (10 in., Brown, Red, and White); *C. parviflorum* (10–20 in., Purple and Yellow); and *C. spectabile* [syn. *reginæ*] (30 in., Pink and White). All flower from May to July, and like a sheltered, semi-shaded site in the rock garden and moist, sandy loam and leaf-mould. Plant in April or September.

Epipactis Royleana [syn. *gigantea*] (Helleborine).—This grows to a height of 15 inches and carries brown and red blooms. Other hardy species are: *E. latifolia* (18–24 in., Purple-green) and *E. palustris* (10–15 in., Purple-brown and White). All flower in summer, except *E. latifolia*, which blooms from August to September. They like a shady site in the bog or rock garden and moist, peaty, and sandy loam. Plant in March.



PRIMULA JULIAE

Goodyera pubescens (Adder's Violet).—This grows some 6 to 10 inches high and has white flowers from May to September. It likes a shady site in the rock garden, and well-drained, peaty leaf-mould and sand. Plant in March.

Habenaria bifolia (Butterfly Orchis).—The flowers of this are white and green. Other hardy kinds include: *H. ciliaris* (Yellow) and *H. fimbriata* (Purple). All bloom from May to July, and grow from 12 to 15 inches in height. They like a partially shaded site and moist, sandy peat. Plant in April or October.

Listera ovata (Tway Blade).—This orchid grows from 12 to 18 inches in height and has green flowers in May, June, and July. It likes a partially shaded site in the rock garden and moist leaf-mould and peat. Plant in September.

Ophrys apifera (Bee Orchis).—The height of this plant varies between 10 and 18 inches; its flowers are purple, brown, yellow, and are borne in June and July. *O. muscifera* (Fly Orchis) has brown, yellow, and blue flowers in May and June and reaches a height of 7 inches. The ophrys like a sunny site and moist, chalky loam and leaf-mould. Plant in September or October.

Orchis foliosa (Madeira Orchis).—This reaches a height of 20 inches, has purple-rose flowers from May to July. Other species: *O. hircina* [Lizard Orchis] (12–36 in., Green-yellow, June–July); *O. latifolia* [Marsh Orchis] (20 in., Pale Purple, May); *O. maculata* [Spotted Orchis] (10–12 in., Mauve or White, May–June); *O. pyramidalis* [Pyramid Orchis] (12 in., Rose or Purple-red, June); and *O. spectabilis* [Showy Orchis] (5–7 in., Purple-rose, May–June). All like a sunny site, except *O. latifolia* and *O. spectabilis*, which prefer shade. They need a moist loam to which has been added well-rotted cow-dung and leaf-mould. Plant in March or September.

Serapias Lingua (Tongue-flowered Orchis).—This orchid grows to a height of 12 inches and has purple and red flowers in May and June. It likes a shady site and does best in well-drained, peaty loam and leaf-mould. Plant in September or October.

Spiranthes autumnalis (Ladies' Tresses).—This orchid grows from 6 to 8 inches high and carries white flowers in late summer. It likes a sunny site in the rock garden or on grassy slopes. Plant in light loam in September or October.

Origanum (Marjoram).—These are hardy herbaceous perennials, some of which are excellent subjects for sunny crevices and ledges in the rock or wall garden. They grow about 9 inches high and, from June to September, carry bracts of glistening rose-pink flowers. The leaves are small and rounded. The origanums thrive in moist, sandy loam and leaf-mould. *Culture.*—Sow seed under glass as soon as ripe or in March, take cuttings in the summer and strike in sandy soil under glass, or divide the roots in March or October. *Species.*—*O. hybridum* (Pink); *O. pulchrum* (Pink).

Ornithogalum (Star of Bethlehem).—The species belonging to this genus are numerous and consist of various bulbous-rooted plants bearing for the most part white or yellow star-like flowers. Some are hardy and fitted for the open; others are half-hardy and better suited for indoor culture. Of the hardy species such kinds as the dwarf-growing *O. umbellatum* (10–15 in.) with white flowers streaked with green, in May, may be employed very effectively in the rock garden. It grows well in ordinary soil in sun or semi-shade. *Culture.*—Plant from September to October, 3½ inches deep and 3 inches apart, and protect from frost in winter. Propagate by means of offsets.

Orontium aquaticum (Golden Club).—This hardy aquatic plant grows well in sun or shade in slow-moving water. The leaves float on the water surface and the yellow flowers appear in May and June. Propagate by means of root division in March, and plant with from 6 to 12 inches of water above the crowns.

Osmanthus.—This is a genus of hardy evergreen shrubs, some of which resemble hollies. *Culture.*—Plant in May or September in sandy loam and in sun or partial shade. No pruning is necessary, but long straggling shoots should be cut back in June. To propagate, strike cuttings of ripened shoots in a frame in September, or layer in summer. *O. Delavayi* (White, March and April, 4–6 ft.) is the best species.

Osmunda (Royal Fern).—The osmunda genus includes hardy and greenhouse ferns; some evergreen, others deciduous. The height of the different species varies from 1 to 8 feet. *O. regalis* is hardy, and does well when planted by the water-side in partial shade and in a sheltered position in peaty loam, leaf-mould, and sand. *Culture.*—Plant in March. Propagate by means of offsets in March, or raise from spores sown under glass, *see* p. 74.

Ourisia.—These are small hardy perennials with crinkled, heart-shaped foliage. They are of creeping habit, and are best grown in moist, rich, sandy loam in the shade, and are excellent for moist ledges in the rock garden. *O. coccinea* (9 in.), with scarlet, trumpet-like flowers from May to September, is the best species. *Culture.*—Sow seed under glass as soon as ripe or in March, or propagate by means of division of roots in April, and plant out in permanent position. No protection is necessary in winter.

Oxalis (Cape Shamrock, Wood Sorrel).—A genus of pretty hardy or half-hardy annuals, perennials, and bulbous plants; all of which have beautiful green clover-like foliage, in some cases glaucous and crinkled, which forms a fine contrast to their richly-coloured blossoms. Several of the hardy dwarf-growing kinds are admirably adapted for culture in the rock garden. They require a gritty loam to which peat or leaf-mould has been added, and a warm, dry position in semi-shade. *O. adenophylla* (Wood Sorrel), 5 inches, which has lilac-pink flowers with a dark eye from May to July; *O. enneaphylla*, 6 inches, with pale pink or white bell-shaped flowers from May to September; and *O. lobata*, 4 inches, with yellow flowers from May to October, are the best rock garden species. The last-named plant likes a sunny position at the base of a rock. *O. adenophylla* makes an attractive little plant for the Alpine House, *see* p. 44. *O. Acetosella rosea*, 4 inches, with purple foliage, is a delightful little flower for the paved garden. *Culture.*—Propagate by means of division of roots in April or October, and plant in permanent position.

Pansy (Heartsease).—*See* Viola.

Papaver (Poppy).—This popular and beautiful genus includes hardy annuals, biennials, and perennials. These should be grown in the sun and will do well in almost any soil, though a deep, rich loam is best. *P. alpinum*, a biennial with glaucous grey leaves, which grows to a height of from 4 to 6 inches and carries yellow, salmon, white, or orange flowers from May to September, is a delightful and fairy-like subject for the moraine, or for ledges in the rock garden. It needs an exposed, open position and a gritty loam, and is raised from seed sown in autumn. It does not transplant well on account of its long tap-roots, and needs protection from excessive damp in winter. The dwarf-growing varieties of *P. nudicaule* (the Iceland Poppy), 6 to 12 inches, with orange, yellow, buff, salmon, or white flowers from May to September, are also extraordinarily attractive little plants. All dead flowers must be picked off, or the season of blooming will be greatly reduced. The last-named are perennials and best propagated by means of root-division in March or October; they should not be lifted oftener than every three or four years.

Parnassia (Grass of Parnassus).—Hardy perennials worthy of a position in the bog, marsh, or water garden. *P. fimbriata* and *P. palustris*, which grow from 5 to 10 inches high and from June to August carry white flowers, are the most suitable species. They like a shady and moist position in bog or at the water margin, and do best in a deep, peaty, or boggy soil. *Culture.*—Sow seed in the open in autumn, or propagate by means of division of roots in April.

Paronychia.—These are little creeping plants, with pretty silvery foliage and white or greenish-white flowers supported in white glistening bracts. They are very attractive when planted in the paved or rock garden, and do best in the sun and in gritty loam. Propagation is best carried out by means of division of roots in March, by cuttings struck under glass, or by seed. *P. capitata* (Silver Foliage) and *P. serpyllifolia* (Green Foliage) are good species.

Peltandra virginica (Water Arrow Arum).—This is a beautiful hardy aquatic plant which thrives in the sun and in ordinary soil at the water's edge. It grows from 24 to 36 inches high, and the greenish-white flowers are borne in May and June. Propagate by means of division of roots in March, and plant out in permanent position in from 6 to 12 inches of slow-moving water.

Pentstemon (Beard Tongue).—The pentstemon genus contains graceful herbaceous perennials, both dwarf and tall. The dwarf species are excellent subjects for the rock garden. These grow from 6 to 9 inches high and flower from June to October. They love the sun and a warm, sandy loam with a third-part of humus in it ; in cold districts they need a sheltered position and protection from frost. *Culture.*—Sow in fine soil in boxes under a glass (50° F.) as soon as the seeds are ripe or early in March. Prick off the young seedlings as soon as possible into other boxes, place them near the glass, harden off gradually, and plant out in April ; or sow seed in the open late in April or in May. If preferred, take cuttings of side shoots (three to four joints of young growth with a "heel") in August, and strike 3 inches apart in sandy soil in a cold frame. Water well and keep in a close atmosphere for a fortnight or three weeks. Syringe the cuttings overhead early in the afternoons if the weather is warm, and plant out in permanent position in April. *Species.*—*P. acuminatus* (Lavender-blue); *P. angustifolius* (Sky-blue); *P. glaber* (Clear-blue); *P. gentianoides* (Pale Violet-blue); *P. lævigatus* (Pale Lilac); *P. Scouleri* (Lavender-blue). *Varieties.*—(White or Carmine-scarlet) *Southgate Gem*; (White or Carmine) *Newbury Gem*; (Scarlet) *Chester.*

Pernettya (Prickly Heath).—Hardy evergreen shrubs, which grow from 2 to 6 feet high and flower in July, bearing in autumn and winter small but brilliant red, pink, or white globular berries on stems covered with small sharp-pointed leaves. They do well in moderate sun and in cool and moist, well-drained peaty loam, and are very attractive if set in prominent positions in the rock garden. *Culture.*—Plant in March or October; no pruning is necessary. To propagate, sow seed in a frame in March, take cuttings in summer, or divide the roots in autumn. *Species.*—*P. mucronata alba* (White); *P. coccinea* (Scarlet); and *P. purpurea* (Purple).

Petasites.—These are hardy herbaceous plants, with large leaves similar to those of the Coltsfoot. The most popular species is *P. fragrans*, the Winter Heliotrope, which grows some 10 inches high and in late winter carries white flowers. Almost any moist soil suits petasites well, and they like a partially shaded position on a moist bank in the bog or rock garden. *P. japonicus giganteus*, which grows about 4 feet high, is an attractive tall species. Propagate by means of division of roots in February or March, or seed can be sown in May or June.

Phacelia.—These are dwarf-growing hardy annuals carrying masses of pretty, bell-shaped flowers from May to August. They like a sunny or semi-shaded position and ordinary soil, and are useful for introduction into the rock garden. *Culture.*—Sow seed in the open in April, and thin out the seedlings to 6 inches apart when fit to handle. *Species.*—*P. campanularia* (Deep Blue, 8 in.); *P. cæsia* (Rose, 8 in.); and *P. tanacetifolia* (Pale Mauve, 20 in.).

Philadelphus (Mock Orange or Syringa).—Beautiful hardy deciduous shrubs belonging to the Syringa genus, and better known under the name of Syringa than the true Syringas or Lilacs. They grow well in sunny positions and in any good garden soil; some of the dwarfer kinds are frequently grown in the rock garden. *Culture.*—Plant in October or November; thin out the shoots well immediately after flowering, and cut back old and weak wood of the previous year to the young lateral growths at the base. If the bushes are much overgrown, cut them hard back in March. To propagate strike cuttings in a frame in September. *Species.*—*P. coronarius* (White); *P. microphyllus* (White); *P. Lemoinei erectus* (White-pink); *P. virginale* (White, Double); and *P. purpureo maculatus* (White Petals, stained Purple).

All these flower from May to August, and grow to a height of from 3 to 10 feet.

Phlox.—This is a magnificent genus of annuals and perennials which need a certain amount of sun and enjoy an open position, but one sheltered from strong winds and the fiercest sun. The dwarf perennials or *Mossy Phloxes* are excellent subjects for the rock and wall gardens. These make large mats of evergreen foliage that become smothered with bloom from May to July. They like a well-drained, gritty loam with plenty of sand and peat in it. After flowering trim back some of the more straggling shoots. *P. subulata* (Moss Pink) has compact evergreen foliage, and may be grown to advantage on a wall, or in the Alpine House, *see* p. 44. *Culture.*—Propagate by means of division of roots in March or October and plant out in permanent position, or take cuttings in July and strike in sandy soil in a shaded frame. *P. paniculata* (40 in., Various Colours, July–Oct.) is a tall-growing species worthy of a place in the bog or marsh garden. *Species.*—*P. amœna* (Carmine-pink, 6 in.); *P. divaricata* (Lavender-blue, 6–12 in.); *P. ovata* (Red, 10 in.); *P. subulata and vars.*

(Pink, Mauve, Blue, and White, 4 in.); and *P. reptans* [syn. *verna*] (Rose-purple, 6 in.).

Phormium (New Zealand Flax).—Handsome tall-growing perennials with large, sword-like leaves arranged in clumps around tall stems 5 or 6 feet in height, carrying Yucca-like heads of crimson or yellow bells from June to September. They require a fairly sheltered, sunny position and a well-drained loam. They make showy plants for moist banks in the bog or marsh garden. *Culture.*—Sow seed in a frame in March, or propagate by means of division of roots in April. *P. robustum* (Yellow, 60 in.) and *P. tenax* (Crimson, 70 in.) are the best species.

Phyllothamnus.—*See* Bryanthus.

Phyteuma (Horned Rampion).—This genus consists of hardy annuals, biennials, and perennials. The dwarf-growing species may be grown in sunny sites in the rock garden in a rich, gritty loam. *P. comosum*, 3 inches, with pale-blue bottle-shaped flowers sitting lightly down amongst the foliage in June and July, a hardy annual; *P. Scheuchzeri*, 15 inches, with blue flowers in May and June, a hardy biennial; and *P. Halleri*, 6 inches, a hardy perennial with violet flowers in May and June, are good kinds. *P. comosum* makes an attractive plant for a wall or for the Alpine House, *see* p. 44. *Culture.*—Sow seed in April, or propagate (perennials) by means of division of roots in spring or autumn.

Phytolacca decandra (American Poke-root).—This plant is an excellent tuberous-rooted perennial for growing near the bog garden. The pinkish-white flowers are borne in summer, and are followed by spikes of dark-blue berries. To propagate sow seed in March under glass or divide the roots and plant out in spring or autumn in any rich soil.

Picea (Spruce).—These hardy evergreen coniferous trees grow best in well-drained loam and in sunny positions. There are dwarf-growing species, such as *P. excelsa globosa nana*, *P. e. pumila glauca*, and *P. pygmæa*, which make striking little trees for prominent positions in the rock garden. *Culture.*—Plant from October to November or in March and April; no pruning is required. Propagate by means of seed.

Pieris (Lily of the Valley Bush).—Hardy evergreen shrubs, which like a moist, non-calcareous soil consisting of peaty loam and sand, and which do best in a sheltered position in sun or partial shade. They grow to a height of from 3 to 6 feet, and carry showy racemes of flowers, usually white, in spring and early summer. These shrubs make striking subjects for the bog or marsh garden. *Culture.*—Plant from September to October. Do not prune, but keep the bushes in shape by means of " stopping " and removing dead flowers in May. Propagate by layering in autumn. Good kinds are *P. floribunda* (White, April–May, 5 ft.); *P. formosa* (White, April–May, 3 ft.); and *P. japonica* (White, March, 4 ft.). *See also* Andromeda.

Pinguicula (Butter-wort, or Bog Violet).—These are hardy little perennial bog plants, which are easily grown in moist, peaty loam, and in a shady position where they will spread out their rosettes of yellowish-green leaves ready to catch the unwary insect on their glutinous surface. *P. vulgaris* (Bog Violet) should be included among the plants grown in the Alpine House, *see* p. 44. *Culture.*—Propagate by means of division of roots in April. *Species.*—*P. alpina* (White); *P. grandiflora* (Blue); and *P. vulgaris* (Purple-violet). All carry tiny, gloxinia-like flowers in April and May, and grow to a height of about 3 inches.

Pinks (Dianthus).—The dianthus genus is a large one, and includes a number of beautiful hardy perennials that provide flowers for the border, greenhouse, wall and rock garden. *D. alpinus* (Pink or White), *D. cæsius* (Rose), and *D. neglectus* (Reddish-pink), that all grow about 5 inches high and flower in June, are species to be recommended amongst this most delightful class, which constitutes the alpine or rock garden pinks. Even when not in flower the little blue-grey tufts of foliage are interesting. These pinks are all easily grown in open, dry, and sunny positions and in a compost of gritty and rather poor loam and leaf-mould with a little lime or mortar-rubble in it (except *D. neglectus* and *D. glacialis*, which dislike lime). They will even grow on the wall, or they may be included among the plants in the Alpine House, *see* p. 42. *D. glacialis* and *D. neglectus*, which only grow from 2 to 3 inches in height, like a position in the moraine. New varieties may be obtained from seed sown in April, May, and June, and old plants may be increased by cuttings of basal shoots that have not flowered, struck 2 inches apart in pots in a frame in July. March is the best time to plant pinks out in the open. All pinks resent disturbance, and should remain in position for several years; the ground, however, should be limed periodically (save in the case of *D. neglectus* and *D. glacialis*), and an annual dressing with a phosphatic manure may with advantage be given. Pinks are also easily increased by division of roots if lifted in September, or they may be layered in July and the young plants can be removed o their new flowering positions in autumn; seed may also e sown under glass in July. The biennial *Dianthus hinensis*, the Chinese or Indian Pink, is best raised from eed in the autumn, wintered in a frame, and set out in he following May; a sunny position is essential and a well-imed or chalky soil is a great advantage. Its variety, . *c. Heddewigii*, and its named sorts, are best treated as nnuals. The tufted species should be protected during he winter from excessive wet by means of glass (*see* p. 25), nd a light top-dressing of light gritty soil around the roots ill help them. The following list shows a selection of pinks hat will be found suitable and more or less easy to grow in he rock garden. There are others in abundance, of course, ome equally beautiful and desirable, but many of them ot so easy to please in regard to soil and situation.

PINKS (DIANTHUS) FOR THE ROCK GARDEN

Name	Colour of Flowers	Flowering Period	Height in Inches	Remarks
D. alpinus .	Bright Rose, Spotted Crimson or White	June	5	Glossy, dark green tufts of foliage. One of the most beautiful. Wall or moraine
D. cæsius .	Rose	June	6	Foliage forms greyish-green carpet. One of the best. Wall or rock crevice
D. deltoides	Red, Rose, or White	June–Sept.	6–8	Very prolific flowerer. Wall, rock ledge, or moraine
**D. glacialis*	Reddish-purple	Summer	3	A very beautiful plant with large, shining, grass-like foliage, that makes a dense carpet. Keep moist and cool in winter, but dry in summer. Wall, rock crevice, or moraine
D. graniticus	Red	June–Sept.	10	Wall or rock ledge
D. Knappii .	Yellow	July–Sept.	12	Wall or rock ledge
**D. neglectus*	Deep Pink	June	3	Large-flowered. Easy, and should certainly be grown. Tufts of fine, grass-like foliage. Rock ledge or moraine
D. plumarius	Various	June	8	Wall or rock ledge
D. sylvestris	Red	May–Aug.	6–13	Wall or rock ledge
D. tener .	Red	July	6	Very good

* Indicates species which are lime-haters. *D. alpinus* requires partial sun only, while *D. glacialis* will grow equally well in sun or semi-shade.

Pinus (Pine).—A large family of hardy evergreen coniferous trees, growing, according to species, from 4 to 200 feet high. Very attractive dwarf-growing species for the rock garden are *P. montana* (Mountain Pine), 4 to 6 feet, and *P. Mughus*, 9 feet. They like a sunny position and prefer light loam, but will grow well in most soils. *Culture.*—Plant in May or September when from 2 to 3 feet high. *P. insignis*, an admirable plant for the seaside, requires protection in winter when young. No pruning is required in the case of any of the pines. Never plant them near a smoky city.

Platycodon (Chinese Bell-flower).—These are hardy herbaceous, tuberous-rooted perennials, which do best in well-drained, deep sandy loam, and in open but shady positions, and are attractive plants for the rock garden. They grow from 10 to 25 inches high, and flower in July and August. *P. grandiflorum*, with glaucous foliage and deep blue flowers, and *P. g. Mariesii*, 10 inches, with white and blue flowers, are good kinds. *Culture.*—Sow seed under glass as soon as ripe or in March, or divide the roots in March or October. No protection is necessary in winter.

Platystemon (Californian Poppy, or Cream-cups).—Hardy annuals with glaucous green foliage and in the summer carrying pale yellow flowers on long slender stalks some 10 inches in height. They like a sunny position and a light soil, and are useful subjects for the rock garden. *Culture.*—Sow seed in the open in April and thin the seedlings out to 3 inches apart when fit to handle. Do not transplant.

Plumbago Larpentæ.—*See* Ceratostigma plumbaginoides.

Podophyllum (Duckfoot, or May Apple).—These hardy herbaceous perennials thrive in partial shade and in moist, peaty loam, and are plants that are well worth including in the bog, marsh, or rock garden. They grow from 10 to 30 inches high and in May carry purple or white flowers on stems rising amid large leaves like those of the horse-chestnut. The flowers are followed by reddish fruit. Propagate by means of division of roots in April. *P. Emodii* and *P. peltatum*, both white and growing to a height of 12 inches, are to be recommended.

Polemonium (Jacob's Ladder, or Greek Valerian).—Hardy herbaceous perennials, some of the dwarf-growing species of which are delightful for the rock garden. These rock garden species, which are tufted in habit, need partial shade and a compost of gritty loam and leaf-mould in the higher and drier parts of the garden. *Culture.*—Seed may be sown in the open in April, but propagation is usually carried out by means of division of roots in March or November. *Species.*—*P. humile Richardsonii* (Blue or White, June–July, 6 in.); *P. confertum mellitum* (White, June–July, 6 in.); and *P. reptans* (Slate-blue, March–June, 12 in.).

Polygala (Milk-wort).—These delightful little plants, mostly shrubby evergreens or hardy perennials with small, roundish dark green leathery leaves, thrive in a mixture of cool, moist, and gritty loam and peat or leaf-mould. They need partial shade and sheltered positions, and are excellent for the rock garden. *Culture.—Perennials* are propagated by seed sown in the open in May and June, or by division of roots in March or October. *Shrubby Species.*—These are increased by cuttings of young shoots struck in coarse sand in a propagating frame in spring. *Species.*—*P. calcarea* (Purple, Blue, Mauve, or Rose, May–Sept., 5 in.); *P. Chamæbuxus* (Yellow and White, June–July, 3 in.); and *P. C. rosea* (Rose, May–July, 5 in.).

Polygonatum (Solomon's Seal).—Hardy perennials like tall Lily of the Valley plants with large, roundish leaves attached to the flower-stems. The best known is *P. multiflorum*. They will thrive in almost any soil and situation, and are useful for moist banks in the bog or marsh garden. *Culture.*—Propagate by means of division of roots in March or October. Seed may also be sown in the open in April.

Polygonum (Knot-wort).—This is a large genus including hardy annuals, hardy and half-hardy perennials, shrubs, climbers, and trailers. *P. affine* (syn. *Brunonis*), with rose-pink flowers in late summer, is one of the best for covering stretches of otherwise barren stonework. *P. vaccinifolium*, with spikes of rose flowers in late summer and autumn, is another excellent trailing species for the rock garden. They require no protection during winter. *P. sachalinense* (Knot-grass), which grows some 8 feet high and in the summer bears white flowers, is useful for planting on moist banks in the bog or water garden. These are all perennials, and are best propagated by means of division of roots in March or October. Seed may also be sown in the open in March or April.

Polypodium (Polypody, Oak Fern, or Beech Fern).—Some of these ferns are hardy, others are only half-hardy. There are both evergreen and deciduous species; all are very ornamental, and grow from 6 to 15 inches high. The hardy sorts, which are extremely attractive when grown in the rock garden, do best in shady, sheltered positions and in dry, sandy, fibrous loam and leaf-mould with a little sandstone but no lime in it. Plant with the rhizomatous roots on the surface of the soil in April. Propagate by means of division of roots in April, or spores may be sown under glass in July.

Pontederia cordata (Water Plantain or Pickerel Weed).—These hardy perennial aquatic plants spread over the surface of water and from June to October bear blue flowers in fine tufts. After flowering they sink their heads in the water till the seed is ripe. They like a sheltered position and a good loam in still, shallow water. *Culture.*—Propagate by means of division of roots in April, and plant out with from 2 to 12 inches of water above the crowns.

Poppy.—*See* Papaver.

Portulaca (Purslane).—These half-hardy plants, which grow about 6 inches high and flower from June to September, are nice little plants for the rock and wall gardens. *P. grandiflora*, with purple, red, yellow, or white flowers, is the best known. *Culture.*—Sow seed thinly in April in the open, or under glass as soon as ripe, or in March, and thin out the seedlings or transplant to 6 inches apart in May and June. They require a sunny site and a sandy soil. Their fleshy leaves will take on a pinkish tinge in autumn, forming a background to a mass of brilliant flowers. *See also* Calandrinia.

Potentilla (Cinquefoil).—A genus of plants, some species of which bear a resemblance to the strawberry in flower and have also a similar manner of propagation. Many species, however, are of a low-growing and shrubby nature; others are hardy perennials. All do well in sun or shade, and the dwarfer species, such as *P. alba* (White); *P. dahurica* (White and Yellow); *P. mandschurica* (White); *P. Menziesii* (Orange); *P. nitida* (Pale Pink); *P. nepalensis var. minor* [syn. *Tonguei*] (Orange, spotted Crimson); and *P. villosa* (Yellow), all of which grow from 4 to 9 inches high and flower from May to September, are worthy of a place in the rock garden. They thrive in deep, sandy loam and in rocky crevices or on the moraine. *P. alba* and *P. nitida* are also useful for the paved garden. *P. villosa* is somewhat tender and needs protecting with glass during the winter. *Culture.*—Sow seed in light loam in spring; increase by division of roots in March or October, or strike cuttings of well-ripened shoots in a frame in autumn. The old and dead wood should be thinned out in September.

Pratia.—These are hardy herbaceous dwarf-growing plants of creeping habit, which thrive in sandy peat and leaf-mould and in sunny positions on well-drained banks in the rock garden, and which from May to August carry small white, pinky-white, or blue flowers on 3-inch stems. *Culture.*—Sow seed in heat in sandy loam and leaf-mould as soon as ripe or in March; take cuttings in August and strike in sandy soil in a frame; or propagate by means of division of roots in spring. *Species.*—*P. angulata* (White); *P. corymbosa* (White); *P. begonifolia* (Blue); and *P. linnæoides* (Pinky-white), are good species. *P. angulata* is also a suitable plant for the bog or marsh garden.

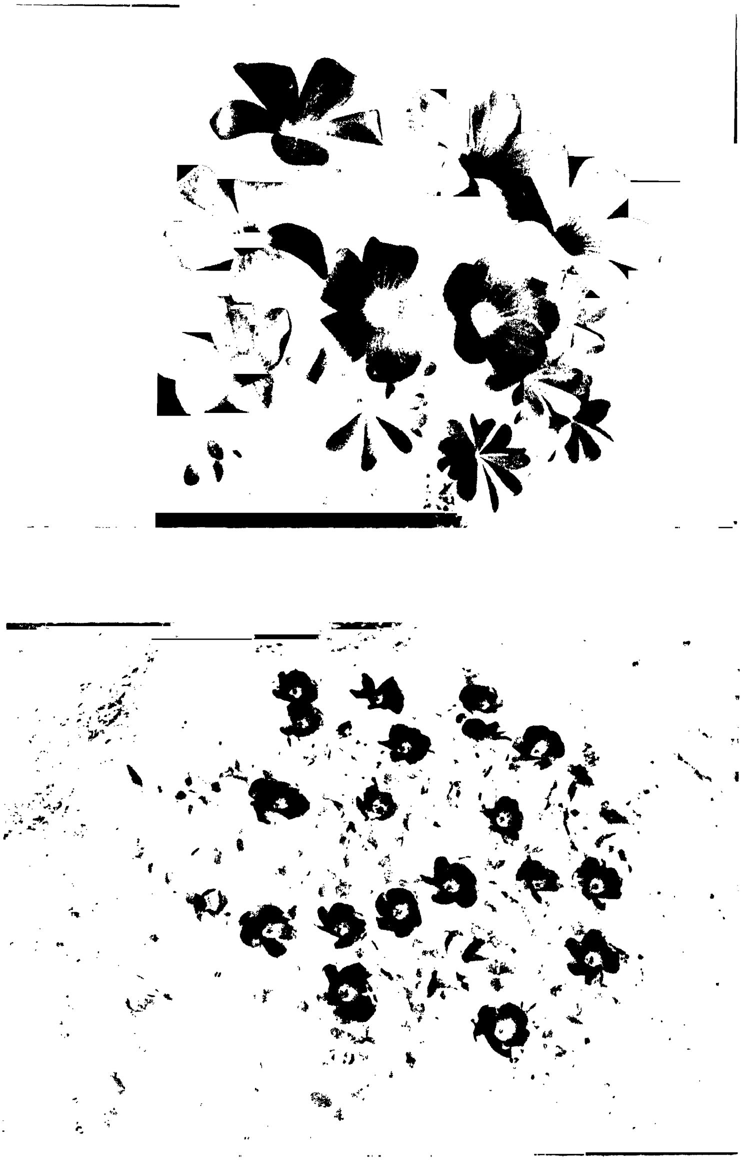
Primula.—A large genus, including over three hundred known species, also some of the most popular flowers, the auricula, the cowslip, the polyanthus and the primrose. In the greenhouse, in the rock garden or bog garden, in beds, and growing wild in the woods, the primula is one of the most useful plants that exist. The species are very varied in their characteristics. In some the leaves are lobed and are borne in rosettes; in others they are elongated. The foliage of many is downy and crinkled; while several species have glossy, bright green leaves. The formation of the bloom is equally varied; some species carry their flowers in whorls and tiers, others singly. In a few cases the flower stems are 2 feet or more in height; in others the blooms appear to rest on the ground itself, so short are the stalks. The majority thrive in rich, deep loam, and appreciate the admixture of old mortar-rubble, leaf-mould, grit, and well-decayed cow-manure with the soil; they are all moisture-lovers, but must have a well-drained soil. The majority like partial shade, unless unlimited moisture is available in hot weather. The alpine, or rock-loving section, love a deep vertical crevice into which their roots can penetrate. Let them have ample soil in the crevice, but scarcely any up round their necks. The rains of the winter are apt to wash the soil from the roots of those not firmly embedded in crevices, and the frosts may also raise them from the ground. In the early spring, therefore, firm the soil around the crowns of these plants, and top-dress them with sifted loam and leaf-mould.

Culture.—Nearly all primulas sow themselves profusely, and as some of them are biennial in character, it is advisable always to have some seedlings in hand. Sow the seed in pots or pans under glass as soon as ripe in May, in a compost of equal parts of loam, leaf-mould, and sand, all sieved through a ½-inch mesh, and well mixed; cover thinly with fine sandy soil and keep in a temperature of 60° F. The seeds, like those of many other alpines, germinate better if sown as soon as ripe. If kept until the following spring, they lose much of their vitality, and in some cases do not come up for a year or more. Prick off the seedlings 1 inch apart into pans as soon as possible, and pot up singly into 3-inch pots or pans; harden off, and keep on a bed of ashes in a shaded frame; plant out in September or early October. Propagate also by means of division of roots in September or in spring. *See also* Auricula.

Alpine primulas are of great value in the rock garden and the bog garden. In the following list we have divided

[*Malby*

Primula Fortunei.



[Malby

Oxalis lobata

them into two classes. The first group thrives among the rocks in rich loam and, therefore, is admirable for the rock garden proper; the second class loves a cool, moist, but well-drained soil, and is suitable for the bog or marsh garden. Each species, however, has different minor requirements, and these are shown, as far as space will permit, in the list referred to. Alpine primulas should be raised from seed, as described above, or increased by division of roots after flowering. Although, strictly speaking, mostly of perennial nature, alpine primulas are very prone to die off in the rock or bog gardens. A few young plants should, therefore, be raised annually from seed, as above described, to replace casualties. Many of these alpine primulas should be selected for cultivation in the Alpine House, *see* list, p. 46. These are best grown in shallow pans 4 to 5 inches in diameter and in a compost of 2 parts of fibrous loam to 1 part of leaf-mould, silver sand, and well-rotted manure. They should be re-potted annually after flowering. Stand in a cold frame or under a north wall in summer so as to rest them, keep fairly dry in autumn and winter, pinching off any flower buds that form; then transfer to the cool Alpine House for flowering. A little soot water may be given from time to time while the buds are forming. Discard the plants after flowering, except in the case of choice species.

ALPINE PRIMULAS

For the Rock Garden

Name	Colour of Flowers	Time of Flowering	Height in Inches	Site	Soil	Sun or Shade
P. Allionii tyrolensis	Pale Pink, White Eye	March–May	5	Limestone Crevice or Wall	Well-drained, Calcareous Loam and Sand	Shade
P. Auricula	Golden-yellow	Spring	6	Vertical Limestone Crevice or Wall	Deep Calcareous, Well-drained Loam	Partial Shade

Name	Colour of Flowers	Time of Flowering	Height in Inches	Site	Soil	Sun or Shade
P. Clusiana	Violet-red, White Eye	April–May	8	Crevice or Wall	Calcareous, Gritty Loam or Peat	Ample Sun
P. Edgeworthii (syn. *P. Winteri*)	Lilac-blue	Feb.–March	4–5	Sheltered Crevice with North Aspect	Deep Calcareous, Well-drained Loam	Partial Shade
P. hirsuta	Rose-purple, White Eye	April–June	6	Crevice	Gritty, Calcareous Loam, Peat and Sand	Partial Shade
P. farinosa (Bird's Eye Primrose)	Rose-purple, Gold Eye	May	6	Moraine, or Alpine House	Light, Rich, Turfy Loam	Sun
P. Fortunei	Pale Blue	April–May	4–8	Alpine House	Calcareous, Gritty Loam or Peat	Semi-shade
P. glutinosa	Deep Violet-blue	May	4	Moraine	Moist, Non-calcareous, and Well-drained Soil with Granite. Or Peat	Semi-shade
P. intermedia	Lilac-rose	March–May	5	Moraine	Moist Loam	Shade
P. marginata	Lavender-blue, Purple, or Violet	Feb.–June	4	Perpendicular Crevice or Alpine House	Gritty, Calcareous Loam	Sun
P. minima	Rose-pink	May–June	1–2	Moraine with Granite and Limestone	Moist, Well-drained, Peaty Loam	Semi-shade
P. nivalis .	White	Feb.–May	6	Vertical Crevice	Loam	Partial Shade
P. spectabilis	Lilac-rose	March–May	5	Moraine	Moist, Calcareous, Sandy Loam and Leaf-mould with ample Drainage	Shade
P. viscosa .	Rosy-purple, with White Eye	March–June	6	Crevice, Alpine House, or Wall	Gritty, Non-calcareous Loam and Sand, with a little Peat, if possible	Partial Shade
P. Winteri.	*See* Edgeworthii.					

For the Bog Garden

Name	Colour of Flowers	Time of Flowering	Height in Inches	Site	Soil	Sun or Shade
P. aurantiaca	Rich Yellow	Sept.	15–20	Rock Garden or Bog Garden	Deep Loam and Leaf-mould	Semi-shade
P. Beesiana	Magenta, with Yellow Eye	May	20–30	Bog Garden	Deep Loam and Leaf-mould	Semi-shade
P. Bulleyana	Orange-buff	April–May	12–18	Bog Garden	Deep, Rich, Moist Loam and Leaf-mould	Semi-shade
P. capitata .	Violet-blue	Sept.–Oct.	6–9	Moraine or Alpine House	Cool, Moist, but Well-drained Light Loam	Semi-shade
P. Cockburniana	Orange-red	May	10	Bog Garden	Fairly Rich Loam and Leaf-soil	Semi-shade
P. denticulata	Deep Lilac and White	Feb.–April	12–18	Bog Garden or Alpine House	Deep, Rich Loam	Semi-shade
P. frondosa	Rose-purple	April–May	4	Moraine	Loam and Leaf-mould	Semi-shade
P. involucrata	Creamy-white, tinged Blue	May–July	8	Bog Garden	Moist, Rich Loam	Semi-shade
P. japonica (*vars.*)	Various	May–Aug.	12–24	Marsh or Bog Garden	Deep, Moist, Rich Loam and Leaf-mould	Semi-shade
P. Juliæ .	Magenta	April and May	4	Bog or Paved Gardens	Moist Loam, Leaf-mould and Sand	Semi-shade
P. Littoniana	Violet	June–Aug.	24	Moraine or Bog Garden	Rich, Moist Loam and Leaf-mould	Semi-shade
P. luteola .	Sulphur-Yellow	July–Aug.	20	Bog Garden	Cool, Deep Loam and Leaf-mould	Semi-shade
P. pulverulenta	Crimson-maroon	April–May	20	Bog Garden	Deep, Moist Loam and Leaf-mould	Semi-shade
P. rosea .	Rose-carmine (Yellow Eye)	March–May	6	Water-edge or Alpine House	Deep, Moist Loam, Leaf-mould and Sand	Semi-shade
P sikkimensis	Pale Yellow	May–June	20	Bog Garden	Deep, Moist Loam and Leaf-mould	Semi-shade
P. Wardii .	Lavender-pink (White Eye)	May	8	Bog Garden	Moist, Rich Loam	Semi-shade

Prunella (Self-heal).—These are dwarf-growing hardy perennials, that do best in moist, light, and rich soil, and in sunny situations in the rock garden. They grow from 6 to 9 inches high and flower from July to September. *Culture.*—Sow seed in the open in April, or propagate by means of division of roots in April or October and plant out in permanent position. *Species.*—*P. grandiflora* (Purple, Red, Blue, or White, 8 in.); *P. vulgaris laciniata alba* (White, 6 in.); and *P. Webbiana* (Deep Pink, 9 in.) [a garden hybrid].

Pteridophyllum racemosum.—This is a minute plant in the poppy family, though seeming very far removed from it. It forms dense little tufts, and looks for all the world like a small Asplenium or Lomaria. Stems, 3 or 4 inches in height, rise from the foliage and from these hang tiny ivory-white flowers. This is a useful plant for the Alpine House, and must be grown in a shady place and in a damp, well-drained, peaty and sandy loam.

Pterocephalus Parnassii.—*See* Scabiosa.

Pulmonaria (Lungwort).—These are hardy herbaceous perennials, growing from 6 to 12 inches high and flowering in April and May. They like a semi-shaded position and light, rich loam, and are useful subjects for planting in crevices in the rock garden. *Culture.*—Propagate by means of division of roots or cuttings in the spring or autumn, and plant out in flowering positions at those times. They require no protection in winter. *See also* Mertensia, under which genus these are now included.

Puschkinia (Striped Squill).—Hardy bulbous-rooted scilla-like plants, which grow about 6 inches high and flower in April and May. They thrive in deep, rich, sandy soil, mixed with leaf-mould, in warm sunny corners in the rock garden. *P. scilloides* (syn. *libanotica*), which is the best-known species, has hyacinth-like blue or white flowers striped with blue, and carries twelve or more on one spike. *Culture.*—Plant the bulbs in October 3 inches deep and

3 inches apart; protect with fibre in winter, and lift from the ground triennially.

Pyracantha (Fire Thorn, Evergreen Thorn, or Cratægus pyracantha).—Very beautiful hardy evergreen climbing shrubs, which in autumn, when covered with their brilliant scarlet, orange, or yellow berries, fully justify their name of "Fire Thorn." They grow best in any good light loam against sunny walls facing south, and can be very striking, if well placed in the bog or rock garden. All bear white flowers from May to June. *Culture.*—Sow seed when ripe, or strike cuttings in summer. Plant from October to April; trim the bushes to shape in early spring, but clip them as little as possible, or much bloom and berries will be sacrificed. *See also* Cratægus.

Pyrola (Winter Green).—This genus contains several pretty little dwarf-growing perennials of the Heath family, with spikes of flowers very like those of the Lily of the Valley. *P. chlorantha* (Pale Yellow), *P. elliptica* (White), and *P. minor* (Red), all flowering in summer and growing about 3 inches high, are popular species for the rock garden. *P. rotundifolia* (White) grows from 6 to 8 inches high. *Culture.*—Propagate by means of division of roots in spring, or sow seed. A semi-shaded site is desirable, also gritty, peaty loam.

Ramondia (Pyrenean Primrose, Rosette Mullein).—A small hardy perennial whose foliage forms large, hairy evergreen rosettes of crinkled leaves. It thrives in the shade or partial shade, in a mixture of cool, well-drained loam, sand, peat, and leaf-mould, and is one of the best plants for the rock garden. *Culture.*—Sow seed in slight heat as soon as ripe or in March, or propagate by means of division of roots in April and plant out in a crevice with the rosette of foliage lying so that its centre points out horizontally. This will allow the wet to drain from it. No protection is necessary in winter. *Species.*—*R. Heldreichi* [syn. *Jankæa Heldreichi*] (Pale Lavender); *R.*

pyrenaica (Pale Purple-blue, Orange Centre) ; *R. serbica* (Mauve) ; and *R. s. Nathaliæ* (Deep Purple-blue). All flower from May to July, and grow from 2 to 4 inches high.

Ranunculus.—A large genus of herbaceous perennials and tuberous-rooted plants, including the common buttercup, most species of which thrive in partial shade, and in moist, deep, well-dug, rich sandy soil with ample leaf-mould in it. The dwarf-growing kinds are splendid plants for the moraine, if grown in good loam to which has been added ample coarse sand and a little well-decayed cow-dung and leaf-mould. The alpine species cannot stand a position in which the soil dries up quickly and they need ample water in summer. *R. aquatilis* and *R. Lingua* are very valuable for the water garden. They are best planted in boggy soil in November, *see* Cultural Details, p. 136. *R. aconitifolius* is a taller species that may be grown with advantage in the bog or marsh garden. *R. alpestris* is the best of the high alpine species. It is vigorous, and all through the summer carries masses of white flowers almost an inch in width. *Culture.*—(*Perennials*)—Propagate by means of division of roots in November or April ; the plants should remain in position for several years, as they hate having their roots disturbed. (*Tuberous Species*)—Plant the tubers, claws downwards, 2 to 3 inches deep and 4 to 6 inches apart, early in March, surrounding them with sand and charcoal. Lift the tubers after flowering. *Species.*—(FIBROUS-ROOTED) —*R. aconitifolius fl. pl.* (White [Double], May–July, 24–30 in.) ; *R. aquatilis* (White, May and June, 2–12 in.) ; and *R. Lingua major* (Yellow, June–Aug., 30–50 in.). (TUBEROUS-ROOTED)—*R. alpestris* (White, May–Aug., 4 in.) ; *R. amplexicaulis* (White and Gold, May–Aug., 6–10 in.) ; *R. gramineus* (Pale Yellow, May–Aug., 10 in.) ; *R. parnassifolius* (White, May–Aug., 5 in.) ; and *R. rutæfolius* [syn. *Callianthemum coriandrifolium*] (White, May–Aug., 5 in.).

Raoulia australis.—This is a compact little creeper with silvery-grey foliage and inconspicuous flowers, which makes a very pretty carpet plant for some hot, dry, stony place. It likes a sunny position and gritty loam and leaf-mould. Seed may be sown in March under glass, or propagation can be carried out by means of division of roots in April or May.

Retinospora.—*See* Cupressus. *C. leptoclade*, which is an attractive species for the rock garden, is frequently grown under the name of retinospora.

Rheum (Rhubarb).—These are hardy herbaceous perennials, which grow from 2 to 8 feet in height and flower in July and August. The ornamental rhubarbs, which thrive in moist, deep, rich loam, on sunny banks in the marsh or water garden, are grown chiefly for their foliage. *R. Collinianum*, 3 feet, with crimson flowers, and *R. officinale*, 8 feet, with yellowish-white flowers, are useful species. *Culture.*—Sow seed in the open in April, or propagate by means of division of the crowns in March or November.

Rhododendrons.—Among the most handsome and finest of all our flowering shrubs are the hardy rhododendrons. Species of rhododendrons are to be found in the wild state in such diverse situations and in climates so opposed that it is not difficult to select subjects that will thrive in any garden, whatever its situation or aspect. The dwarf alpine species include such shrubs as *R. ferrugineum* and *R. hirsutum*, both 1 to 2 feet, with white or pink flowers from May to July; *R. lapponicum*, 9 inches, with purple flowers in July; and *R. racemosum* and *R. impeditum*, both 1 to 2 feet, with lilac flowers in March. These grow high up on the mountain sides, and are most suitable for the rock garden. They need but little shade. The habit and growth of many of the smaller bushy species will depend on the situation or climate afforded them. If grown in an exposed site open to all weather, they will form dense flat-topped masses little more than a foot in height; if, however, placed in semi-shade and given a moist atmosphere, they make bushes three or more feet in height. The plants referred to are those on the borderline between the shrubby species and the dwarf alpine kinds. Smallest of all are: *R. intricatum*, *R. Kamtschaticum*, and *R. Sargentianum*. There are also species, such as *R. viscosum*, 1 to 4 feet, with pink flowers from May to July, which make excellent subjects for the bog or marsh garden.

Most hardy species thrive best in a position sheltered from north and east winds and in semi-shade, and prefer thoroughly-trenched and well-drained, moist, peaty loam, but will grow in almost any soil deficient in lime or chalk, providing it contains ample decaying vegetable humus, and is sufficiently porous. Most species flower in May and June, but a few early kinds bloom in March and April. Rhododendrons bear frequent transplanting so long as the "ball" of earth round their roots is not broken. They are surface-rooters and will not grow on steep banks where the roots will be likely to parch up in summer. Except in the case of such hybrids as *Bagshot Ruby*, *The Bride*, or *Pink Pearl*, which will grow in full sun, but prefer a light shade, rhododendrons require some sun, which should, however, be intermittent; these shade conditions are best supplied by bushes planted among the rhododendrons. In addition to the hardy and half-hardy species, there are choice greenhouse kinds, which require moist warmth all the year round. When purchasing rhododendrons care must be taken that the species chosen are suitable for the situation and climate.

Culture.—Plant and "heel-in" very firmly in October or November, or at any time in winter and spring, up to May, providing the soil is not water-logged and that there is no frost. When planting add some well-rotted cow-dung, but keep it well away from the roots; fresh stable manure must not be used. If the weather is dry, soak the hole well before planting, and in any case a little leaf-mould should be placed at the bottom for the roots to rest upon. Bushy species should be set 6 feet apart, and smaller lime-hating subjects, such as azaleas, cistuses, daphnes, and heaths, can be used to fill the gaps until the rhododendrons have grown a bit. Do not prune young bushes, merely keep them in shape by means of " stopping " and removing dead blooms immediately after flowering. When it is necessary to cut back old and straggling plants, do so in March. Top-dress the plants annually in March with some good leaf-mould, and every second or third year give a 4-inch top-dressing of well-rotted cow-manure in autumn, or in May.

Propagation.—To propagate hybrids, graft (stock *R. ponticum*) under glass from January to May, layer well-matured shoots in late summer, or take cuttings. Species may be increased by means of seed sown thinly in pans in March or April, in a compost of equal parts of well-sieved leaf-mould and coarse sand in a cold frame. Most species may be raised from cuttings of semi-matured shoots, struck in a frame with bottom heat, and practically all species can be layered in summer.

Rhodothamnus chamæcistus.—These are dwarf-growing, ericaceous, evergreen shrubs that carry pretty, pale-pink flowers from March to May. The leaves are edged with spines and the plants, which grow from 6 to 12 inches in height, do best in a well-drained, peaty soil, and are most pleasing subjects for semi-shaded sites in the rock garden.

Rodgersia.—Hardy perennials growing 4 feet high and in June or July bearing pink or white flowers amidst very coarse horse-chestnut-like leaves. They thrive in partial shade in a moist border of peaty soil by the water's edge. Propagation is usually carried out by means of division of roots in March. *R. æsculifolia* (Pink) is a good species.

Roses.—Many of the dwarf-growing species of roses are excellent for inclusion in the rock garden, and among them we have *Rosa alpina pyrenaica*, a crimson-flowered rose, only attaining a height of about 2 feet. With this may be grown *Rosa seraphim*, a Corsican native, which is trailing in habit, and only reaches a total height of about 10 or 11 inches. It bears bright pink single flowers in June, at the ends of the shoots. It has an added beauty in its curious fern-like leaves, and altogether the plant is a useful addition to the rock garden. *Rosa nitida* is another of these dwarf roses with very lovely foliage, which in summer is a dark shining green, but which changes to purple in the autumn. As its spines are thickly set and of a clear red, and the flowers pink, it makes a fine piece of colour throughout the summer and autumn. It spreads very quickly and strongly by means of underground stems.

Soil.—The very best soil for roses is a deep, stiff loam. The worst soil for roses, after pure sand, or nearly so, is the black soil of the town garden, very porous, and over-full of organic matter. Peaty soils, if rich in character, are quite good for roses, a general rule being that the more gravelly or sandy a soil, the less favourable for the rose. An essential for a good rose soil is that it should be well drained. Gravel has had a bad reputation for roses, but it is not altogether deserved. It is usually considered too dry and hot for roses to thrive in, but really, if a little care is taken to improve it, it will grow very good roses. Chalk, providing that it is deep enough below the surface, and that there is a good depth of soil on top, is not a bad subsoil. It is well drained, and not too dry in hot weather. Where it is very close to the surface it is bad, and needs a lot of work and preparation, if it is going to grow good roses. Eighteen inches of decent loam is the minimum for roses on chalk, and where the loam is shallower than this special places must be prepared for the plants and extra soil supplied.

Situation.—Roses like shelter, and they like an open situation. They dislike wind, although they like fresh air, and hate to be shut in by big trees. The spot to look for, then, is one sheltered from frosts and violent winds, and not close to high hedges or trees. Shelter is desirable from north and east winds.

Planting.—Early November is the best time of all for this operation, though it may be done right through the winter—should conditions be favourable—until the end of March.

First, the soil must be thoroughly broken up to a depth of at least 2 or 3 feet. Next, the soil must be thoroughly well drained. Before the roses arrive, the soil should be re-turned to a depth of about 18 inches, and a good allowance of manure incorporated with it. The lowest layer of soil in the bed should consist of rich, fairly retentive soil, which will hold a certain amount of water, while the upper layers should be lighter and more friable. The holes to receive the roots should be dug from a foot to 18 inches square and deep enough, where bush roses or dwarfs are to be planted, for the point of junction of the scion and the stock to be covered, when planted, to a depth of about an inch.

When roses are planted during the autumn and winter months, their first pruning should be left until the spring; but when spring-planted, it should be done at the time of putting in. They should be gone over carefully and all dead wood should be cut clean out, together with weak and sappy, unripened growth, and any shoots which have received injury.

Propagating Roses.—The most usual method of propagating the rose is by budding, which operation is carried out in July. Roses are often propagated from cuttings, and certainly, where the roses do as well on their own roots, they are easier to deal with than when budded. In the latter case there is always a risk that the stock may shoot out vigorously and choke the more delicate scion. When making cuttings, it is simplest and best to take cuttings from well-ripened wood which carries a good number of strong, healthy leaves, in the summer, after the roses have done flowering. These cuttings will root well in the open air. A shoot which has borne a flower should be selected, and should be cut off with about three or four leaves attached. The leaf nearest the flower should be removed, the shoot being cut off short above the second leaf and just below the lowest. If the cuttings are to be rooted absolutely in the open, a bed should be prepared in a shaded situation, the soil being worked up a little with decayed manure, sand, and leaf-mould. A frame is, perhaps, more satisfactory than the open ground, but is not essential. The cuttings should be set 3 to 4 inches apart, and should be well watered in, water being again given with a sprinkler morning and evening. The cuttings do as well or better planted in pots, as they seem to root more quickly. A hand-light or a cold frame placed over them will help rooting. (*See also* Cuttings, p. 95.)

Where roses are grown from seed, a method only employed when new varieties are being raised, the essential point is that the seed shall be allowed to ripen thoroughly and shall never become dry. The pods should be left on the plants until they are almost dropping, and should then be picked stalk and all, and the latter set in damp sand until the following November or December, when the seed is to be sown. The seeds often take a complete year to germinate. Where seedlings are being raised for the sake of new varieties, the tiny plants are budded on to briars even during their first year; as soon, in fact, as it is possible to take a bud from them. The seedlings will usually flower in their first year, but a bud should in all cases be secured, if possible, as the little plants often die after flowering.

Rosmarinus officinalis (Rosemary).—These are hardy, shrubby perennials with aromatic evergreen leaves, which like a sunny position and a light, dry soil, but which will do well almost anywhere. The bushes grow from 3 to 6 feet high and flower in April and May. *R. o. prostrata* is a trailing shrub suitable for growing in the rock garden. *Culture.*—Plant in March or September; trim the bushes to shape after flowering. To propagate, sow seed in the open in April, or strike cuttings in July.

Rubus (Bramble, Raspberry, etc.).—A large genus of hardy deciduous shrubs and climbers, including the ordinary blackberry, loganberry, and raspberry. Some of the dwarf-growing kinds are occasionally introduced into the rock garden, chiefly for the beauty of their tinted foliage and brightly-coloured berries in autumn. These like a shady position and rich loam. *Culture.*—Plant in October; cut out old and dead wood after flowering. Propagate by means of suckers in the autumn.

Sagina (Pearl-wort).—These are very charming little plants with tufts of moss-like foliage and white flowers in the summer. They are of creeping habit, and should be planted in the sun in gritty loam. These plants should certainly be introduced into rock and paved gardens. Propagation is best carried out by means of division of roots in the spring. *S. glabra* and its varieties are the best known.

Sagittaria (Arrow Head).—Hardy aquatic plants, which thrive in a mixture of clay, sandy loam, and rotted manure. They grow from 10 to 30 inches high and flower from June to October, according to species. *S. japonica* (White, 30 in.) is one of the best kinds; there is also a double variety. *S. latifolia var. flore pleno* (White, June and July, 12 in.) and *S. sagittifolia* (White, dashed with Pink, June-August, 30 in.) are also useful. *Culture.*—Sow seed ¼-inch deep in April, or propagate by means of division of roots in March. Plant in March in weighted baskets in still, shallow water with from 6 to 12 inches of water above the crowns.

Salix (Willow).—A genus of hardy deciduous trees, excellent for growing near a pond or stream. *S. babylonica* is the common Weeping Willow. There are a few species with brightly-coloured stems; these are usually cut hard back annually in spring. Many of the dwarf willows, such as *S. arbuscula*, *S. Bockii*, *S. herbacea*, and *S. retusa*, are very ornamental in the rock garden, and if possible should be grown in a site with a northern or eastern aspect. *Culture.*—Plant in October in a sunny position and in moist soil at the water's margin or in deep, heavy loam. Pruning, except when the trees are cut hard back annually as mentioned p. 269, is not necessary, but dead wood should be cut out. To propagate, strike cuttings of matured wood in the open in November or any winter month up to the beginning of March.

Sambucus (Elder).—This is a genus of deciduous shrubs or small trees bearing in summer white flowers followed by umbels of dark purple berries from which the country-folk distil wine. S. *nigra* is the Common Elder. S. *canadensis* (Canadian Elder) and S. *maxima* (American Elder) are suitable subjects for planting in the bog or marsh garden. *Culture.*—Plant in October in partial shade, and in moist loam, or, if need be, in almost any soil and situation. Cut well back in spring. To propagate, strike cuttings in the open in October.

Sanguinaria (Blood-root).—Hardy herbaceous perennials, which like a moist, sandy loam enriched with ample leaf-mould, and a sunny position in the rock garden. They grow 6 inches high and in spring bear large, anemone-like flowers. *Culture.*—Sow seed in the open in April, or propagate by means of division of roots in March or October, and plant in permanent position. S. *canadensis* has white flowers.

Santolina (Lavender Cotton, Holly Flag).—Hardy evergreen plants with soft grey aromatic foliage and shrubby growth. They bear yellow flowers from June to August, and like a dry ordinary soil and a sunny position. S. *incana* (10 in.) is a nice little plant for the wall garden. *Culture.*—Propagate by means of division of roots in March, or take cuttings in July, and strike in sandy soil in a frame.

Sanvitalia procumbens.—This is a rather pretty hardy annual of trailing habit, that from June to September carries masses of yellow flowers with purple centres. It grows about 6 inches high, and is well worthy of inclusion in the rock garden. *Culture.*—Sow seed thinly ¼-inch deep in April; thin out the seedlings to 8 inches apart when fit to handle.

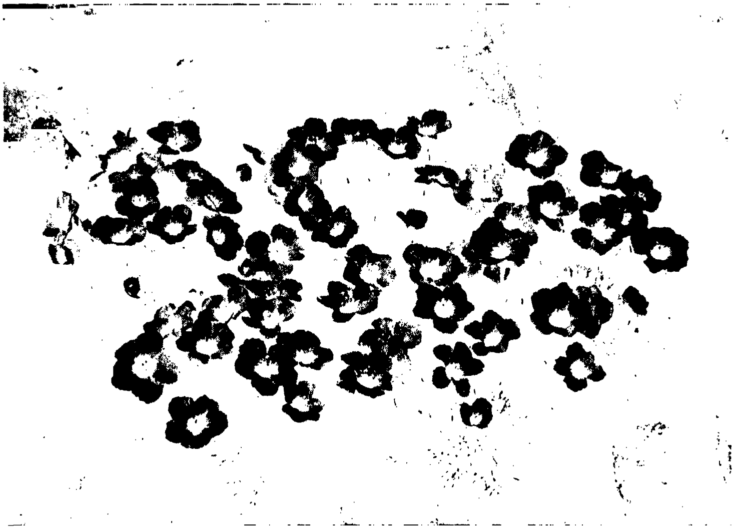
Saponaria (Soapwort).—This genus includes attractive little hardy annuals of tufted habit and a few perennials, the creeping species of which are excellent for carpeting the ground with their mounds of foliage and pretty little star-like flowers during the summer and autumn months. They are particularly suitable for draping the boulders in the rock garden. The saponarias like a sunny position and dry, light, gritty, well-drained loam, and bear cutting back, if necessary, for a late autumn display. The hardy perennial trailer *S. ocymoides*, or the Rock Soapwort, flowers so profusely as to present to the eye a sheet of rosy-pink. *Culture.*—Sow seed under glass as soon as ripe or in March, or in the open in April, or propagate by means of division of roots (perennials) in April or October. *Species.*—(*Annual*)—*S. calabrica* (Rosy-red, June–Oct., 6 in.). (*Perennials*)—*S. cæspitosa* (Rosy-pink, June–Sept., 4 in.), and *S. ocymoides and alba* (Rose or White, May–July, 6 in.).

Sarracenia (Huntsman's Horn).—These are half-hardy insectivorous perennials growing from 6 to 20 inches high and flowering in June. Their leaves are in shape like huntsman's horns standing erect and some 6 inches to a foot in height, down which inquisitive blow-flies are lured and then absorbed. The sarracenias like a sunny position and a fairly cool but moist compost of half-peat and half-sphagnum moss. *S. purpurea* (Purple, 10 in.) is a quaint species for a moist bank in the bog or marsh garden. It is best propagated by means of division of roots in April.

Saxifraga (Saxifrage, Rockfoil).—This genus is a very large one and includes numerous species of which there are many varieties, and the group is also swelled by a seemingly endless number of hybrids. In addition, this genus is the most useful among alpine plants, for with it alone one could almost furnish the whole rock garden, so varied are the species both in characteristics and habit. Of the species in cultivation the majority are perennials, which are very hardy and easy to grow. They vary in height from 2 inches to 3 feet, according to species, and furnish bloom from January until July, though the majority flower in May and June. There are kinds that will suit any position in the rock garden. Some love the shade ; others require a rocky crevice in the sun ; a few thrive in the moraine, in the paved garden, or in the Alpine House (*see* p. 48) ; and yet others do best at the side of a pond or stream. The species are grouped into a number of sections ; all the plants in one section are of more or less the same habit and have approximately similar wants. We will give the cultural requirements of each section and a list of a few of the chief species in each group. By far the most important sections are, firstly, the Encrusted or Silvery Saxifrages (*Euaizoonias*), and, secondly, the Mossy Saxifrages (*Dactyloides*).

Euaizoonias (Encrusted or Silvery Saxifrages).—The broad leaves of the species in this section, which includes *S. Aizoon and vars.*, *S. Cotyledon and vars.*, and *S. lingulata and vars.*, are glaucous green or silvery in colour and are edged with encrustations of silvery wax. They form silvery-grey rosettes, large or small, according to species, which go to make up rounded heaps that gradually envelop the rocks, or which form wide greyish carpets from which in spring and early summer rise tall panicles of white or pale pink blossom. These encrusted saxifrages are the easiest to grow of all the great family, and are happiest in the crevices of limestone rocks, on a wall, or in the moraine, but will do quite well almost anywhere when given a rather gritty and very stony soil, and a warm, sunny site ; they hate a damp, over-shady place. Seed can be sown when ripe on a bed of damp moss, or the roots can be divided at any time in summer. *Species.*—*S. Aizoon and vars.* (Creamy-white, Yellow, or Rose, 6–10 in.) ; *S. cochlearis* (White, 3 in.) ; *S. Cotyledon and vars.* (White, 18 in.) ; *S. florulenta*

Saxifraga Irvingii.



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Saxifraga Burseriana, var. "Glori

Saxifraga apiculata, var. alba.

[Malby

Saxifraga lingulata, var. Lantoscana superba.

(Rose-purple, 10 in.); *S. Hostii* [syn. *elatior*] (White, spotted Pink, 15 in.); *S. lingulata* (White, 15 in.); *S. longifolia* (White, 25 in.); and *S. mutata* (Orange, 18 in.). All flower from May to July.

Dactyloides (Mossy Saxifrages).—The moss-like foliage of these charming little species and varieties, which include *S. decipiens and vars.*, *S. Miss Willmott*, and *S. Wallacei* (syn. *Camposii*), forms low, dense, bright green masses, which in May and June are profusely decked with large white, rose, or red flowers. These plants must have shade from scorching sun, and love ample leaf-mould in their soil. They will grow in almost any well-drained soil, but prefer a compost of gritty loam, leaf-mould, and sand, and should be given a cool position in semi-shade. If placed in a sunny spot, they will clamber vigorously over the rocks to the detriment of other dwellers in the rock garden, and will bear but few flowers. They will die off, if they get too much damp in winter, and should, therefore, be given a well-drained slope. Increase by division of roots in late summer, or sow seed in spring in gentle heat. *Species and Varieties.*—*S. Clybranii* (Crimson, 5 in.); *S. decipiens* [syn. *cæspitosa*] (Red to White, 6 in.); *S. hypnoides* (White, 5 in.); *S. Miss Willmott* (Cream, blotched Chocolate, 5–9 in.); *S. muscoides* (White, Yellow, or Red, 4 in.); *S. m. Rheii* (Rose-pink, 5 in.); *S. sanguinea superba* (Deep Scarlet, 5 in.); *S. trifurcata ceratophylla* (White, 4 in.); and *S. Wallacei* [syn. *Camposii*] (White, 4 in.). All flower from May to June.

Kabschias ("Cushion" or Tufted Saxifrages).—This is another most useful section, including *S. Burseriana and vars.*, *S. Elizabethæ*, *S. Kestonensis*, and *S. Rocheliana and vars.*, in which the close, hard, and horny scale-like foliage makes little domes of silver, grey, or green, covered from March to June with brilliant flowers of white or golden yellow on wiry stems from 2 to 3 inches in height. These plants need an open and cool, but fairly sunny site, facing preferably east or west, in the rock garden. The most suitable compost consists of two-thirds limestone chippings and one-third gritty loam, leaf-mould, and sand. Above all, the soil must be well drained and ample moisture should be available in summer ; indeed, no place suits the *Kabschias* better than the moraine. The species in this section are not so easily grown as those in the first two groups. Plants in the open must, in winter, be given the protection of a frame-light, or a sheet of glass, and in spring should be mulched with a little of the above-mentioned compost. Increase by division of roots after flowering, by cuttings in the spring or autumn, or raise from seed in gentle heat as soon as the seeds are ripe or in spring. *Species and Varieties.*—*S. apiculata* (Pale Yellow, March–May, 4 in.) ; *S. Boydii* (Yellow, March–May, 3 in.) ; *S. burseriana and vars.* (White or Yellow, Feb.–April, 4 in.) ; *S. cæsia* (White, May–July, 2 in.) ; *S. diapensioides* (White, April–May, 3 in.) ; *S. Elizabethæ* [syn. *Cherry Tree*] (Citron-yellow, March–May, 4 in.) ; *S. Faldonside* (Yellow, April, 4 in.) ; *S. Grisebachii* (Purple-crimson, April, 5 in.) ; *S. Kestoniensis* (White, April–May, 4 in.) ; *S. lilacina* (Lavender-rose, April–May, 2 in.) ; *S. luteo-viridis* (Pale Yellow, April, 6 in.) ; *S. media* (Purple, April, 6 in.) ; *S. Rocheliana and vars.* (White or Yellow, March–May, 5 in.) ; *S. Salomonii* (White, April, 3 in.) ; *S. sancta* (Yellow, April, 4 in.) ; *S. scardica* (White, May, 3 in.) ; and *S. p. thessalica* (Red and Yellow, May, 6 in.).

Porphyrions.—This is not a large section, but a very delightful one, and includes such favourites as *S. oppositifolia and vars.* and *S. pyrenaica.* The plants are mostly from 3 to 4 inches in height—some less—and in spring bear their large and brilliant blooms on very short, stumpy, creeping stems ; they are, unfortunately, rather shy in flowering. The leaves are deep green, small, and form a dense prostrate mat. Give these plants a cool position in partial shade and a well-drained compost of moist, gritty loam and leaf-mould. Mulch annually in spring with a little of the above compost, and water liberally in spring and early summer. Increase by division of roots. *Species.*—*S. hirculus major* (Golden, July–September, 5 in.); *S. oppositifolia and vars.* (Crimson-purple, March–May, 2 in.); *S. pyrenaica* (Deep Purple, March–May, 2 in.); and *S. retusa* (Rose, May–July, 2 in.).

Englerias.—Some species and varieties in this section, which includes *S. Bertolonii* and *S. calyciflora* (syn. *media*), have dense, horny foliage; in others the leaves form thick, silvery rosettes from which in May and June the small pendant flowers, usually purple, red, or yellow, rise on stems 5 inches or so high. They love warm, fairly sunny crevices between the rocks, and will do best in a light, calcareous loam that is always just on the moist side. Propagate by seed sown in gentle heat as soon as ripe or in spring, or divide the roots after flowering in summer. *Species and Varieties.*—*S. Bertolonii* (Pink and Yellow), and *S. calyciflora* [syn. *media*] (Purple). Both flower from April to May, and grow to a height of from 5 to 6 inches.

Megasea (Giant or Large-leaved Rockfoils).—These may be known by their large size and the expanse of evergreen foliage. They carry large heads of flowers and are excellent border plants. They thrive in sun or semi-shade and in ordinary garden loam, and may be propagated by seed sown in gentle heat in the spring, or by division of roots in the autumn. *Species and Varieties.*—*S. crassifolia* (Pale Pink, 15 in.); *S. cordifolia* (Rose-red, 12–18 in.); *S. ligulata speciosa* [syn. *megasea*] (Purple-rose, 12–24 in.); and *S. Stracheyi* (Pink and White, 10 in.). All flower from April to May.

Diptera.—This section likes a sunny position in the Alpine House, and needs a light, gritty loam. Propagate by means of seed, by division of roots, or by layering. *Species.*—*S. cuscutæformis* (White, June, Trailing), and *S. sarmentosa* [Mother of Thousands] (Yellow or White, June–Sept., 10 in.).

Robertsonia.—These are evergreen, and like a shady position and a light, gritty loam. Propagate by means of seed (gentle heat) as soon as ripe or in the spring, or by division of roots in the summer. *Species.*—*S. cuneifolia* (White, 5 in.) ; *S. Fortunei* (White, Oct.–Dec., 10 in.) ; *S. Guthriana* (White, spotted Red, 8 in.) ; *S. umbrosa var. primuloides* (Rose, 5 in.) ; and *S. umbrosa and vars.* [*London Pride*] (Rose and White, 10 in.). All flower from May to June.

Trachyphyllum.—These thrive in semi-shade and in moist, gritty loam. Propagate by means of seed (gentle heat) sown as soon as ripe or in spring, or by division of roots in summer. *Species.*—*S. aizoides* and *S. aspera.* Both are yellow and flower from May to June. They grow from 3 to 5 inches high.

Scabiosa pterocephala (syn. *Pterocephalus Parnassii*).—Pretty little perennial rock plants with tufts of greyish foliage and pale violet flowers from June to September. They grow from 4 to 6 inches high and are useful for carpeting or for sunny ledges with a deep and cool root-run in well-drained gritty loam and leaf-mould. Seed may be sown in March under glass, or cuttings may be taken in early autumn.

Schizocodon.—Pretty little evergreen plants of tufted habit, which thrive in shady, sheltered sites in the rock garden. They love a moist but well-drained compost of two-thirds sandy peat and one-third loam, together with some grit and charcoal. *S. soldanelloides*, with rose-coloured, fringed soldanella-like flowers in summer, is the best known ; it grows about 4 inches high. Seed may be sown under glass as soon as ripe or in March, or propagation can be carried out by means of division of roots in the spring, or by rooted offsets in late summer.

Scilla (Squill).—The species of this genus are very numerous and are easily grown, the best known being *S. nutans*, otherwise the Bluebell or Wild Hyacinth. They are hardy,

Shortia uniflora

[*Malby*

Lewisia Cotyledon.

spring-flowering bulbous plants, most species of which do well if massed in warm, sunny sites in the rock garden. Among the most attractive species are : *S. bifolia*, 6 inches, with white, pink, or blue flowers in February and March ; *S. italica*, 8 inches, with blue flowers in May ; and *S. sibirica*, 6 inches, with blue flowers in March. *Culture.*—Plant in September or October 2½ inches deep and 4 inches apart in good garden or sandy soil. Propagate by means of offsets in September.

Scirpus (Club Rush).—This is a class of hardy perennial marsh or aquatic plants, of which *S. lacustris*, the Common Bulrush, is the best known. *Culture.*—Propagate by means of divisions of roots in March, and plant out in shallow water at the edge of a pond or stream. *S. Holoschoenus var. zebrinus* (Porcupine Rush), which only grows about 3 feet high, is the more suitable to small gardens.

Scolopendrium (Hart's Tongue Fern).—This genus contains both hardy and greenhouse ferns, which grow from 5 inches to 2 feet in height. The hardy sorts thrive in sandy loam, peat, and leaf-mould, with a little mortar in it. They should be planted in the shade in a sheltered spot in the rock garden, or on a moist bank in the bog or marsh garden. *S. vulgare* is the common Hart's Tongue fern. *Culture.*—Plant in April. Propagate by means of division of roots in April, or sow spores under glass in July. *See also* Ferns, p. 80.

Scutellaria (Skull-caps).—These pretty little rock plants grow in poor, shallow, and dry soil, and from August to October carry pink or purple flowers on 6- to 10-inch stems, according to species. *Culture.*—Sow seed in the open in May or June, or increase by division of roots in March or October. *Species.*—*S. alpina* (Purple, 6 in.) ; *S. altissima* (Purple, 10 in.) ; and *S. minor* (Pink, 6 in.).

Sedum (Stonecrop).—Sedum is the common name of a large and important family of hardy plants, mostly perennials, the low-growing species being chiefly suitable for dry, sunny places in the rock, paved, or wall garden. The succulent foliage enables the plants to withstand long periods of drought and makes them of great value in dry situations. *S. acre* is the common Stonecrop. Most of them are evergreen, and in autumn the leaves assume a lovely purple hue, which lasts until the following spring. Sedums do well in a dry, light soil with lime in it, and will grow where but little soil is available. The summer-flowering kinds like a sunny position ; autumn-flowering species do equally well in sun or shade. One of the best is *S. spathulifolium purpureum.* In June it carries heads of golden flowers, and its foliage, which is greyish in summer, becomes a brilliant red in autumn. *S. pulchellum,* which loves ample moisture during the growing season, is a useful species for cultivation in the Alpine House, *see* p. 50. *Culture.*—Sow seed under glass in sandy soil as soon as ripe or in March, or in the open in April, and plant out the following autumn or spring. If preferred, propagate by means of division of roots in April or October. The smaller kinds require the protection of glass in winter. *Species.*—*S. acre aureum* (Yellow, May and June, 3 in.) ; *S. album* (White, May and June, 6 in.) ; *S. Anglicum* (Pink and White, June–Aug., 4 in.) ; *S. dasyphyllum* (Pink and White, June–Aug., 3 in. [Grey Foliage]) ; *S. Douglasii* (Yellow, June, 6 in.) ; *S. Ewersii* (Rose-purple, June–Aug., 6 in. [Glaucous Foliage]) ; *S. farinosum* (White and Pink, July, 3 in.) ; *S. pulchellum* (Rosy-purple, Summer, Trailer) ; *S. spathulifolium purpureum* (Gold, June–Aug., 5 in.) ; and *S. spurium* (Rose, June–Aug., 6 in.).

Sempervivum (Houseleek).—A large genus of curious succulent plants of symmetrical rosette-like form. They are mostly hardy perennials, although some require the protection and warmth of a greenhouse. The best known is *S. tectorum,* the Common Houseleek or Sengreen (10 in.), which flowers in July. It grows on the top of walls and on roofs, and often increases to such an extent as to cover a considerable area. The flower is red, and the rosettes of fleshy leaves are ciliated at the edges and pale green in colour with a brown tip. Sempervivums are interesting all the year round and are well suited to sunny chinks or bare ledges in the rock, paved, or wall garden. They thrive in sandy loam, even where but little soil is available, and in places where few other plants would live. They die after blooming, but propagation is easy (*see* below). *Culture.*—Sow seed under glass as soon as ripe or in March, take cuttings in summer and strike in sandy soil under glass, or propagate by means of division of roots in April and plant out in permanent position. Except for *S. arachnoideum*, the Cobweb Houseleek, with its cobweb-like white down, the hardy kinds need no protection in winter. This last-mentioned plant and *S. calcareum* are interesting subjects for cultivation in the Alpine House, *see* p. 50. *Species.*—*S. arachnoideum* (Reddish-pink, June–Aug., 5 in.) ; *S. arenarium* (Yellow, June, 8 in.) ; *S. calcareum* (Pale Red, Summer, 6–10 in.) ; *S. globiferum* (Yellow, July, 6 in.) ; *S. Pittonii* (Yellow, July, 6 in.) ; *S. tectorum* [Common Houseleek] (Red, July, 10 in.) ; and *S. triste* (Red, June, 6 in.).

Senecio alpinus (Groundsel).—This is a hardy perennial, which does well in a gritty soil and in sun or semi-shade. It grows about 15 inches high and in June and July carries yellow flowers. Propagate by means of division of roots in spring or autumn. Of the shrubby senecios, *S. laxifolius*, with grey foliage, is the best. *S. Clivorum*, 40 to 60 inches high, with yellow flowers in July and August, may be grown in a corner of the paved garden.

Shortia (Crimson Leaf).—Very lovely, hardy perennials which are evergreen and of rather dwarf habit, and which grow best in a moist but very well-drained compost of two-thirds sandy peat and one-third loam, together with some rough grit and charcoal. A sheltered, shady position in the rock garden suits them. In summer they carry

Soldanella (Moonwort).—Pretty hardy perennial rock plants with heart-shaped evergreen leaves, and fringed flowers rather like shuttlecocks hanging from wiry stems. Soldanellas grow best in the shade or semi-shade, in rocky crevices, or, better still, on the moraine in moist, gritty loam, and peat or leaf-mould. They are, unfortunately, at times rather shy flowerers. *Culture.*—Propagation is carried out by means of seed sown in a frame as soon as ripe or in the spring, or by division of roots after flowering. In winter they should be given the protection of a pane of glass. *Species.*—*S. alpina* (Violet-blue, May–June, 4 in.); *S. pusilla* (Violet, June–July, 3 in.); and *S. pyrolæfolia* (Lilac, March, 6 in.).

Specularia [syn. *Legousia*] (Corn Violet, Venus' Looking-glass).—These are delightful little hardy annuals, which in summer carry dainty, bell-shaped flowers, and which thrive in a compost of sandy loam and peat in the rock garden. *Culture.*—Sow seed in autumn where they are to flower and thin out the seedlings to at least 6 inches apart; if preferred, cuttings of young wood may be struck in a frame in early summer. *Species.*—*S. falcata* (Blue); *S. hybrida fl. pl.* (Lilac or Blue); *S. perfoliata* (Purple and Blue); and *S. speculum-veneris* (Purple or White).

Spiræa.—A genus of graceful and attractive plants, both herbaceous and woody and mostly hardy perennials with fern-like foliage and pyramidal and feathery spikes of flowers. They love a moist, rich loam and require plenty of water. If the soil is light, mulch in early summer with decayed manure and vegetable humus. Such species and varieties as *S. Aruncus* [Goat's Beard] (40–50 in., with white flowers in June and July) and *S. palmata* [Meadow Sweet] (24–48 in., with rose-crimson and white flowers in July and August) are very showy plants for the bog or marsh garden. For the rock garden, *S. bullata* (Red, 12 in.), *S. procumbens* [syn. *decumbens*] (12 in., with white flowers in June, July, and August), and *S. Anthony Waterer* (Pink with variegated leaves) are best. *Culture.*—Propagate by means of division of roots in March or October; cuttings of young wood may also be struck in a frame in autumn. Thin out the older wood of spring-flowering shrubs after flowering, if the bushes have become unshapely. Shrubs that flower between July and September should have all weak wood cut away in February, and all other shoots that have flowered must be cut back by at least one-half.

Squill.—*See* Scilla.

Statice [syn. *Limonium*] (Sea Lavender).—The dwarfer-growing species of these extremely beautiful "Everlasting" flowers thrive in sunny positions in the rock garden and in well-drained, sandy loam and leaf-mould. They are for the most part plants of thick, leathery foliage and carry minute whitish flowers resting in a calyx of everlasting opalescent pink. Among the most valuable species are: *S. alpina*, 6 inches, with purple flowers; *S. auriculæfolia*, 6 inches, with blue flowers; *S. incana*, 10 inches, with reddish-pink flowers; and *S. sinuata*, 10 inches, with yellow and purple flowers. They flower in July and August. *Culture.*—Sow seed in the open in April, or propagate by means of division of roots in spring or autumn.

Sternbergia (Yellow Star Flower, Winter Daffodil).—Beautiful half-hardy bulbous plants, which need a compost of sandy soil mixed with a little leaf-mould and mortar-rubble. They should be given sunny positions in the rock garden. *Culture.*—Plant in April 4 inches deep and 5 inches apart; *S. Fischeriana*, however, which flowers in February, should be planted in July or August. Protect from frost with fibre and lift the bulbs from the ground triennially; or pot-up in July and grow in the Alpine House. Culture in the open is only advisable in warm districts. Propagate by means of offsets in April. *Species.*—*S. colchiciflora* (Yellow, Aug.); *S. lutea angustifolia* (Yellow, Aug.–Sept.); and *S. Fischeriana* (Yellow, Feb.–March). All grow to a height of about 10 inches.

Stratiotes aloides (Crab's Claw or Water Soldier).—Hardy perennial aquatic plants, with long sword-like leaves, that float on the surface of the water. They grow about 20 inches high, bear white flowers in June, and like a position in shallow, still water. Unfortunately they increase so rapidly that they are apt to become a nuisance in ornamental waters, so must be kept in check. *Culture.*—Propagate by means of division of roots in March, and plant in ordinary soil with from 3 to 12 inches of water above the crowns.

Symphyandra.—These are charming little plants for crevices and ledges in the rock garden. They grow from 6 to 24 inches high, and in July and August carry white, blue, or pale yellow flowers, thriving in well-drained gritty loam. Seed may be sown under glass in March, or propagation can be carried out by means of division of roots in spring or autumn.

Taxodium distichum (Summer Leafing Cypress).—A hardy deciduous tree, growing from 50 to 100 feet high, which does best in sunny positions near water in moist or swampy soil. *Culture.*—Plant from September to October; no pruning is required. Propagate by means of seed in a frame, or by cuttings struck in slight heat in July.

Taxus baccata ericoides.—The dwarf yew is a useful addition to the rock garden. Plant in May or September. When necessary, trim in May or August. Seed may be sown in the open in March, or cuttings of young wood may be struck in a frame in September.

Teucrium (Germander).—This genus includes some useful little herbaceous perennials, which thrive in the sun and in gritty loam, and make interesting plants for the wall and rock garden. *Culture.*—Propagate by means of seed sown in a frame in June or July or by division of roots in March, and plant out in permanent position. *Species.*—*T. Chamædrys* (Blue, July–Aug., 10 in.); *T. Marum* (Deep Pink, Aug.–Sept., 10 in.); and *T. Polium* (White, Yellow, and Purple, Summer, 6 in.).

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Silene Hookeri

Thlaspi rotundifolium.

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Wahlenbergia Pumilio.

Thalictrum (Meadow Rue).—Hardy herbaceous perennials with fern-like foliage and pretty little plume-like flowers borne in umbels. A curious feature of these flowers is that they have no petals, but the sepals are coloured. They thrive in moist but well-drained, rich, sandy loam, and in sunny or shady situations by the side of a stream. The dwarf kinds, as *T. alpinum* and *T. tuberosum*, are useful rock plants. *Species.*—*T. adiantifolium* (Yellow, June–Sept., 12 in.); *T. alpinum* (Greenish-yellow, May–June, 4–6 in.); *T. dipterocarpum* (Rose, Purple, or White, June–Sept., 36–50 in.); *T. glaucum* (Yellow, July–Aug., 48–72 in.); and *T. tuberosum* (White, Aug.–Sept., 12 in.).

Thlaspi rotundifolium.—These pretty little rock plants are easily raised by means of seed sown under glass in March, or by division of roots in spring or autumn. The flowers, which appear in July and August, are rosy-lilac in colour.

Thuya (Arbor Vitæ).—These hardy evergreen shrubs have beautiful foliage, and are often used instead of yews as hedge plants. They succeed in sunny positions and in any moist soil, and are valuable in the bog or marsh garden. *T. dolobrata* (syn. *Thuyopsis dolobrata*) is an especial favourite. *Culture.*—Plant in May or September; no pruning is necessary. Trim hedge plants in April and September. Propagate by means of seeds sown in a frame, or by cuttings struck in a frame in September.

Thymus (Thyme).—Hardy, dwarf-growing, bushy or trailing plants with fragrant foliage, that are useful for carpeting, for the wall, for the rock garden, also for the crevices between the flags in the paved garden. They grow well in the sun and in well-drained sandy loam. *Culture.*—Sow seed under glass as soon as ripe or in March, or propagate by means of division of roots in April, and plant out in permanent position. No protection is necessary in winter. *Species.*—*T. argentea* (Silver Leaves, 8 in.); *T. longiflorus* (Rosy-purple, 2–3 in.); *T. membranaceus* (Pink, 4–5 in.); *T. nitidus* (Pink, 12 in.); *T. serpyllum* (Purple

Flowers, Grey Foliage, 3 in.) ; *T. S. album* (White, 3 in.) ; *T. S. citriodorus* (Purple Flowers, Trailing) ; and *T. S. lanuginosus* (Grey Leaves, Purple Flowers, 5 in.). All flower from June to August.

Tiarella cordifolia (Foam Flower).—These are beautiful hardy herbaceous perennials with creamy-white, plume-like flowers and heart-shaped foliage that assumes a lovely reddish-brown in autumn. They grow about 9 inches high and flower from April to June, thriving in moist soil and in shady positions in the rock garden. *Culture.*—Sow seed in the open in April, or propagate by means of division of roots in March and plant out in a permanent position.

Tigridia (Tiger Iris).—These magnificent half-hardy bulbous plants, the flowers of which are like huge open tulips of varying colours, thrive in a mixture of light, rich sandy loam and leaf-mould, and love a warm, sunny position in the rock garden. They grow from 12 to 18 inches high and flower from May to July, amidst leaves like those of the iris, but smaller. *Culture.*—Plant the bulbs about the middle of April 4 inches deep and 6 inches apart, letting the bulbs rest on sand ; lift from the ground in November. Propagate by means of offsets in April. *Species and Varieties.*—*T. conchiflora* (Yellow, Purple Spots) ; *T. grandiflora rubra* (Crimson, Scarlet, and Yellow) ; and *T. Pavonia* (Scarlet, marked Yellow and Purple).

Tilia (Lime).—Hardy deciduous trees, mostly of spreading and lofty growth, which grow well in sunny, sheltered positions and in moist, rich soil. Most species bear fragrant yellowish-green flowers from June to August. They make suitable subjects for the large bog or marsh garden. *Culture.*—Plant in October or November ; thin out the branches when overcrowded. To propagate, sow seed, or layer basal shoots, which will be produced after the tree has been cut down close to the ground.

Trientalis (Starflower and Wintergreen).—These small hardy perennials should be grown in a light, rich soil, and in a shady and moist position in the rock garden. *T. americana* (Starflower) bears white flowers on 6-inch stems in June or July, and *T. europæa* (Wintergreen) in April or May. Propagate by means of seed sown in summer, or by division of roots in spring.

Trifolium (Clover, Shamrock, Trefoil).—Hardy annuals and perennials which thrive in any light soil, and are easily raised from seed or propagated by means of division of roots. They may be introduced into the rock garden, if so desired. *T. alpinum*, once established, throws up large flowers that make the plant well worth growing.

Trillium (Wood Lily or Trinity Flower).—These are beautiful hardy and rather curious tuberous-rooted perennials, which should be grown in well-drained, moist, peaty soil, and in partial shade in the bog or rock garden. *Culture.*—Plant in October ; lift the bulbs from the soil when overcrowded. Propagate by means of seed sown in a frame as soon as ripe or in March, or in the open in June, or increase by division of roots in October. *Species.*—*T. californicum* [syn. *ovatum*] (Pale Purple, May–July, 8 in.) ; *T. grandiflorum* (Rose or White, June–July, 6–12 in.) ; *T. erectum* (Deep Purple, May–June, 5–10 in.) ; and *T. sessile californicum* (White, May–June, 8 in.).

Triteleia.—*See* Brodiæa.

Trollius (Globe Flower).—These are hardy herbaceous perennials of the buttercup order with dark green, palm-like foliage, and which grow luxuriantly in rich, moist loam in shady situations in the marsh garden or at the edge of a pond or stream. *Culture.*—Sow seed in the open in April, or propagate by means of division of roots in April or October (preferably), and plant out in permanent position. Lift and divide the roots when overcrowded only. In autumn top-dress with decayed manure and leaf-mould. *Species.*—*T. asiaticus* (Yellow or Orange, May and June, 24 in.) ; *T. Ledebourii* (Golden Yellow, April–May, 30–40 in.) ; and *T. napellifolius* (Orange, May–June, 30 in.).

Tropæolum (Nasturtium).—Most of the tropæolums are unsuitable plants for cultivation in the rock garden, but *T. polyphyllum*, a beautiful little trailing plant with greyish foliage and yellow flowers in June and July is well worthy of a place; it is also suitable for the wall garden. It likes a dry, sunny position in well-drained sandy loam, and may be raised by means of seed sown under glass in March, or cuttings may be struck in sandy soil in heat in March or April.

Tsuga (Hemlock Spruce).—These are hardy coniferous trees growing from 70 to 100 feet high and doing best in sunny positions and in moist, deep loam. They are only suitable for large bog or marsh gardens. *Culture.*—Plant in May or September. No pruning is required. Propagate by means of seed sown in a frame. Two of the most ornamental species are *T. Albertiana* (syn. *T. mertensiana*), growing to 70 feet in height, and *T. canadensis*, which reaches a height of 80 feet.

Tulips.—Several of the dwarf species of tulip are useful for obtaining early colour in the rock garden. *T. silvestris* (Yellow, April–May, 10–12 in.); *T. Clusiana* (White with Crimson Eye, May–June, 6–9 in.); *T. montana* (Bright Red, May–June, 6 in.); and *T. persica* (Yellow, May–June, 6 in.), are all suitable. *Culture.*—Plant the bulbs in early November about 4 inches deep and about 4 inches apart. They like a sunny position, and a well-drained, rich, sandy loam with lime in it. Lift the bulbs every third year in June (when the leaves have withered) and propagate by means of offsets planted in September or October.

Tunica.—Dwarf-growing hardy perennials admirable for the rock garden. *T. Saxifraga*, which bears a smother of tiny flowers on very fine stems, will also flourish in the moraine, wall, or paved garden. A sandy loam suits them best, and they will grow in either sun or shade. Propagation is by means of division of roots in the spring, or seed may be sown in April where the plants are to flower. *Species.*—

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WAHLENBERGIA VINCÆFLORA

T. Illyrica (Red, June–Aug., 8 in.) and *T. Saxifraga* (Pale Rose or White, June–Sept., Trailing).

Typha (Reed Mace, Bulrush, or Cat-o'-Nine-Tails).—A genus of aquatic plants of tufted habit, which thrive on a swampy bank in the marsh garden or at the edge of a sheltered pond with from 1 to 12 inches of water above the crowns. They grow some 6 feet high and flower in late summer. Propagation is carried out by means of division of roots in March or October. *T. latifolia* with brownish-black flowers is the best known.

Vaccinium.—A large genus of shrubby plants, which includes the Whortleberry or Bilberry (*V. Myrtillus*), a pretty heath-like shrub 18 inches in height with drooping pink flowers in May and showy dark blue globular fruit. There are several other species grown for the beauty of their flowers, fruit, and tinted foliage in autumn; these require a moist, sandy, and peaty loam. *V. corymbosum* is particularly suitable for culture in the bog or marsh garden. Propagate by means of cuttings struck under glass in spring and summer, by root-suckers, or by seed sown in autumn when ripe. Plant out in March. *Species.*—*V. arctostaphylos* [Bearberry] (Greenish-white, 6 ft.); *V. corymbosum* [Blueberry] (Pale Pink or White, 5 ft.); and *V. Myrtillus* [Whortleberry or Bilberry] (Pale Pink, 1½ ft.). All are May-flowering.

Valeriana.—This is a genus of hardy perennials of which the smaller species make charming subjects for the rock garden; the best known is *V. officinalis* (All-heal). They thrive in sunny situations and in any ordinary soil. *Culture.*—Sow seed in the open in April, May, June, or July, or propagate by means of division of roots in March or October and plant out in permanent position. *Species.*—*V. elongata* (Yellow, 6 in.) and *V. heterophylla* (Red, 10 in.). All flower from June to October.

Veronica (Speedwell).—A large genus of beautiful flowering plants, including annuals, herbaceous perennials, and evergreen shrubs. Some of the dwarf-growing shrubs and herbaceous perennials make excellent subjects for carpeting and edging in the rock garden. *V. salicifolia* (White) and *V. Guthriana* (Blue) are species to be recommended for growing in the wall garden. *V. repens*, which forms a dense, evergreen mat, is excellent for the paved garden. SHRUBBY SPECIES.—The evergreen shrubs of this genus are amongst the most valuable of summer and autumn-blooming plants, both for greenhouse culture and for out of doors, where, with a dry subsoil and somewhat sheltered, sunny situation, the plants will generally stand uninjured through the winter. *Culture.*—Plant in April or September. Trim annually to keep the bushes in shape only, but it is usually necessary to prune hard back every few years. To propagate, strike cuttings of matured wood in a frame in August ; the young shoots should occasionally be pinched back, but no "stopping" must be done after June. The herbaceous species thrive in sunny positions and in any fairly good garden soil, especially if it is rather gritty. Every fourth year the plants should be lifted and divided, the younger outer crowns only being replanted. Propagate by means of division of roots in March and (some species) in October. *Species and Varieties.*—(HERBACEOUS)—*V. Allionii* (Deep Blue, May–July, 5 in.) ; *V. Balfouriana* (Bright Blue, July, 3 in.) ; *V. Guthriana* (Pale Blue, Summer, 6 in.) ; *V. incana* (Violet-blue [Silver Foliage], June–Sept., 6–9 in.) ; *V. repens* (Blue, May–July, Prostrate) ; *V. rupestris* (Blue, June–August, Trailer) ; *V. saxatilis* (Rich Blue [Red Centre], June–Sept., 4 in.). (SHRUBBY)—*V. Andersonii* (Purple or Blue, July–Sept., 2 ft.) ; *V. Autumn Glory* (Deep Violet, Sept.–Oct., 1½ ft.) ; *V. buxifolia* (White, June–Aug., 2 ft.) ; *V. cupressoides* (Violet-purple, July–Sept., 1 ft.) ; *V. Hectori* (Pale Lilac and White, July, 1 ft.) ; and *V. Kotschyana* (Pink, July–Sept., 3 in.).

Viburnum.—Hardy deciduous trees and shrubs with white or pinkish flowers, and in most cases with handsome fruit. They thrive in any soil, but prefer a moist, well-drained, deep loam, and are most useful (some species) for the rock garden. The best-known shrubby species is *V. opulus sterile*, the Guelder Rose or Snowball Tree, 8 to 10 feet, with white flowers in July. Other good species are: *V. Carlesii*, 3 to 6 feet, with pinkish-white flowers in April and May; *V. fragans*, pink or white, January to March; and *V. tomentosum*, 5 feet, creamy-white, May and June. *Culture.*—Plant in a sunny position, in October, November, or March. Trim the bushes into shape annually, and, when necessary, cut out old wood in July. Propagate by means of cuttings in a frame in June, or layer in October.

Vinca (Periwinkle).—The hardy periwinkles are dark evergreen shrubs of trailing habit and with smallish insignificant flowers. They grow in any well-drained ordinary soil, and look well on moist banks in the bog garden or in the rock garden. *V. major* and *V. minor* have purple-blue flowers from June to September, and are indigenous to Great Britain. *V. major* grows to a height of 20 inches; *V. minor* to a height of 9 inches only. The flowers of *V. minor* are smaller than those of *V. major*, and there are also purple, mauve, and white varieties of it, as well as double blue and double white kinds. *V. rosea*, with white flowers with a pink eye or with rose-coloured flowers, is also known as "Old Maid," or "The Madagascar Periwinkle." *Culture.*—Plant from March to October. Cut back straggling shoots in April. Propagate by means of division of roots in March or October.

Viola.—Violas, sometimes called Tufted Pansies, are much used for bedding or as edging plants, where they will flower from May until well into November. There are many delightful alpine species that are very showy in the rock garden. *V. cornuta* and *V. gracilis* are good examples. They are mostly quite hardy and are excellent for filling up odd and rather shady corners in the rock garden, or for crevices between stones in the paved garden. For the more dainty violas from the high alpine screes, only moraine culture should be essayed. Any ordinary, deeply-dug, moderately rich loam will suit them, provided it is fairly loose, gritty, and moist; and a sprinkling of good compost and a dressing of soot or bonemeal should be scattered on the top; heavy clay is not good for violas. A cool, but not damp, position in partial shade is best. *Culture.*—Violas may be propagated from seed, by cuttings, or by division of the roots. Seed intended to furnish spring flowers should be sown in boxes in June, using a good light soil, and the box should be covered with a sheet of glass until the seeds are up. When fit to handle, transplant the seedlings 2 inches apart into other boxes, water liberally, and shade from sun. As frosty weather approaches, the boxes should be placed in a cold frame for the winter. At the beginning of April, transplant the young plants about 9 to 12 inches apart into partially-shaded beds, keeping the "balls" as far as possible intact. Cuttings of new but vigorous growths from the centre of the plant may be struck in September in a shady frame and planted out in March for blooming the following year. Propagation by cuttings may take place any time from April to the end of October, although August and September are the best months. For early flowering, it is best to propagate by division of old roots in September. All dead blooms should be periodically picked off. *Species and Varieties.*—(White) *V. septentrionalis*; (Yellow) *V. biflora lutea*; (Purple) *V. gracilis* and *V. Munbyana*; (Violet) *V. cenisia*; (Violet and White) *V. thuringia*; (Violet and Yellow) *V. pedata*; (Lavender-blue) *V. Lady Crisp*; (Blue, Lavender, Rose and White) *V. cornuta*; (Pale Pink) *V. Hazelmere* and *V. bosniaca. Viola hederacea* is rather a quaint creeping form with small violet-coloured flowers fading to white at the tips of the petals.

Virginian Stock (Malcomia).—These are pretty little hardy annuals with lilac, red, and white flowers in early spring, if sown in autumn, or from July to September, when sown in spring. They do well in sunny situations and in fairly light soil, and are useful for filling odd pockets in the rock garden. *Culture.*—Sow seed thinly in spring or autumn, covering it lightly with soil. Thin out the seedlings when fit to handle. Constant picking of flowers and seed-pods will prolong the flowering period. *Varieties.*—(Crimson) *Fairy Queen* ; (Purple and Crimson) *Crimson King.* Both grow about 6 inches high.

Vittadenia triloba.—A beautiful little dwarf-growing plant, also known as *Erigeron mucronatus* (*which see*), which may be set in shady positions and in sandy loam. It grows about 4 inches high, and is excellent for ledges in the rock garden. The daisy-like flowers, which are white and pink, are borne from April to September. *Culture.*—Sow seed under glass as soon as ripe or in March or September, or take cuttings in spring or autumn, and strike in sandy soil under glass. Plant out in a crevice or on an old wall in April or September. They require no protection in winter.

Wahlenbergia (Edraianthus, Tufted Harebell).—These are charming little dwarf-growing, hardy perennial plants suitable for the moraine in the rock garden. They bear large, bell-shaped flowers on short, arching stems, which rise from hummocks of grass-like foliage. These little plants love a sunny position and a gritty loam with a little lime-rubble, and are better protected by means of a sheet of glass in winter. They are easily raised from seed sown under glass as soon as ripe or in March ; they may be propagated by means of cuttings, or by division of roots after flowering. *W. Dalmatica* (Violet), *W. Pumilio* (Lilac), *W. serpyllifolia* (Violet-blue), and *W. vincæflora* (Blue), flowering from June to August, are good species. *W. serpyllifolia* makes a delightful little plant for the Alpine House (*see* p. 50), or for growing on a wall.

Waldsteinia.—Only a few species of this genus are cultivated, and these but seldom. They have sprays of yellow flowers, some in early summer and others in spring or autumn. These plants grow about 8 inches high and their creeping stems form dense masses that spread over the rocks. They thrive in sun or shade and in ordinary soil, and are admirable plants for rocky ledges, banks, or dry walls. *Culture.*—Propagate by means of division of roots in March, and plant out in permanent position. They require no protection in winter. *W. trifolia* (Yellow, March–June, 6 in.) is, perhaps, the best known species.

Wallflower (Cheiranthus).—For spring-blooming these hardy biennials and perennials are indispensable, because of the delicious fragrance of their beautiful flowers. The dwarf-growing species, 6 to 12 inches in height, may be grown in sunny crevices in the wall garden or in the rock garden in dry, sandy loam with some lime in it. The double wallflowers do not seed and must be raised from cuttings. The perennial species are usually grown as biennials. *Culture.*—Sow seed thinly in early June in drills 12 inches apart, in an open position, or take cuttings (double varieties) in September and strike in sandy soil in a frame. Transplant the seedlings when 2 inches high to 6 inches apart, water well, and nip out the centres to encourage bushy growth, as soon as the plants are established. Plant out in position for flowering early in October. Seed may also be sown in the open in April. Cut back after flowering, if to be grown as perennials. *Species.*—*C. Allionii* (Bright Orange, 10 in.); *C. alpinus* (Pale Yellow, 10 in.); *C. kewensis* (Primrose, 12 in.); *C. Marshallii* (Orange-yellow, 6 in.); and *C. variabilis* (Various, 10 in.). These all flower from April to June.

Weldenia candida.—This is one of the best alpines, though as yet very rare. It is of tuberous nature, and dies down in winter, when it ought to be covered with a few branches or with glass. In spring it throws up shoots like those of *Iris alata*. In late spring these stems support the most exquisite white waxy flowers. Propagation may be carried out only by dividing the roots in early autumn and planting in a well-drained compost of peaty loam and sand and in a sheltered position.

Wulfenia.—These are useful and showy little hardy herbaceous perennials, which like a shady position in the rock garden and a mixture of sandy loam and peat. The bluish-purple flowers in July and August rise on 9-inch stems above bright green rosettes of leaves with toothed edges. *Culture.*—Sow seed under glass as soon as ripe or in March, or propagate by means of division of roots in April. No protection is necessary in winter. *W. carinthiaca* is a good species.

Xerophyllum asphodeloides (Turkey's Beard).—Graceful hardy perennials which make striking plants for the marsh or wild garden. They love partial shade, and a moist gritty loam and leaf-mould. In May they carry tall spikes (some 2 feet high) of ivory-white flowers. *Culture.*—Propagate by seed sown in the open in June, or by division of roots in March or October.

Yucca.—These are all practically hardy evergreen plants of quaint appearance, forming striking objects when planted in the rock garden. Yuccas do best in sheltered, sunny positions and in well-drained soil. *Culture.*—Plant in March or April; cut away dead leaves in March and withered flowers in October. Propagate by means of tops, with the leaves trimmed off, planted in pots of very sandy and porous soil, by the division of rhizomes in spring, or by seed. *Species.*—*Y. recurvifolia,* one of the best species for the garden, has graceful, drooping, dark green leaves and greenish-white inflorescences some 3 feet in height in August and September; *Y. gloriosa,* which is known as Adam's Needle, has long, stiff, sword-like leaves and inflorescences of greenish-white, bell-shaped flowers in August; and *Y. angustifolia,* which is a hardy and more or less dwarf species, has narrow, spear-like leaves which radiate from the crown and form a rosette some 2 feet high. The white and green inflorescences of bell-shaped flowers rise in July and August to a height of 3 feet. This is the most suitable species for the rock garden.

Zauschneria (Californian Fuchsia).—Handsome perennials with a profusion of beautiful, tube-shaped, scarlet flowers from July to September. The plants grow from 12 to 18 inches high, and flourish in gritty loam on walls, or in hot, sunny crevices in the rock garden. *Culture.*—Propagate by means of division of roots in March, or take cuttings in spring and strike in sandy soil under glass. Plant out in permanent position in March or April. No protection is necessary in winter. *Z. californica splendens* (Scarlet, July–Sept., 12–18 in.) is the best known.

Zenobia speciosa.—This is a hardy, ericaceous shrub that is semi-evergreen and reaches a height of from 3 to 4 feet. From June to August it bears on slender stems drooping bell-like flowers of a waxy whiteness. It is a most interesting plant for growing in the bog or marsh garden. *Z. pulverulenta* is very similar to *Z. speciosa,* but has its leaves and stems covered with a steely-white mealy dust, which makes it a very decorative plant, especially in winter. *Culture.*—Plant in a semi-shaded position in September or October and in well-drained, peaty soil or in a mixture of loam and leaf-mould (no lime). Cut off old flower shoots after blooming. Propagate by means of soft cuttings in a frame in June, or by means of layering in September.

CHAPTER XIII

DISEASES AND PESTS

Insect Pests

IT cannot be too strongly impressed that every effort should be made to detect the presence of pests at the earliest possible moment and to set about destroying them immediately. Pests are more or less controllable if tackled as soon as they make their appearance, but if allowed to run unchecked, will soon multiply exceedingly and do untold harm.

The soil in a newly constructed rock garden is almost certain to be pest-ridden, and should be fumigated or sterilized before any planting is done. In the Alpine House, too, very much better results will be obtained with some of the choicer alpines, if their compost is thoroughly sterilized (*see* p. 302) before they are potted-up.

Below we show the best ways of combating a few of the pests that most frequently attack our rock gardens, and complete the chapter by articles on soil fumigation and sterilization, also on insecticides and fungicides.

Ants.—The best time to get rid of ants is in the early spring, when all the young brood is hatched and food is greatly in demand. Sprinkle sugar round their haunts, and they will reveal their nest by carrying the sugar into it. Saturate the nest with paraffin or some strong disinfectant, or destroy it with boiling water. Empty honey jars or old treacle tins make good traps for the little pests, and hundreds may be easily destroyed by plunging the traps, when infested, into boiling water. Old pieces of sponge, dipped in syrup, are equally efficacious.

Leather Jackets (*Tipula*).—These are the grubs of Daddy-long-legs. They do great damage to the roots of many plants, feeding just below the soil and working their way right into the centre of large roots, and, in damp weather, and at night, attacking the stems of the plants. The Daddy-long-legs, or Crane-fly, as it is sometimes called, needs no description. These flies should not be confused with the Daddy-long-legs spider, which is quite harmless. The Leather Jacket is so called because of its hard leathery skin. It has no legs, is cylindrical in shape, and of an earthy-brown colour. The head is black and the tail-end is blunt with several short finger-like projections. The eggs are laid from June to September on the ground or just below the surface. They hatch in a fortnight, and the grubs feed for ten months or more and remain just below the surface of the earth through the winter and spring. Early in summer they become pupæ, which have several spines pointing backwards and a couple of horns in front. The flies soon emerge from the pupæ cases, which are left projecting half out of the soil.

Prevention and Treatment.—Break up new land thoroughly in the summer, as the grubs will soon die if exposed to hot sun and dry soil, and where possible keep weeds well in check by constant hoeing. Dig naphthalene, at the rate of 2 oz. to the square yard, thoroughly into the soil and water well.

Earwigs.—Earwigs are easy to trap, owing to their propensity to hide in anything during the day. Thus a handful of straw, shavings, or hay, pushed into a flower-pot and placed on a stick, will be found full of earwigs in the morning. Crumpled paper, hollow stalks, pieces of corrugated cardboard, and all such things, make effective traps.

Slugs.—Slugs bury themselves in the ground or under leaves and other rubbish and come out at night-time to feed on young foliage. They are always more numerous and destructive after long, wet, mild winters and will continue to feed all the year through under favourable conditions. For prevention and treatment, *see* Snails. When found, a pinch of salt on the head and back is sufficient to kill a slug, or they may be gathered and dropped into salt water.

Snails.—Do not allow rubbish to accumulate in odd places; keep the garden tidy. Encourage frogs and toads and insectivorous birds, such as the thrush, which devour snails and slugs, and where feasible allow poultry to range over the land. Dust young growths over with a mixture of soot and lime to prevent the pests from devouring them. At night or early in the morning sprinkle lime thickly on the soil and repeat the process two or three days in succession, this will kill numerous snails; others may be trapped in orange skins, lettuce leaves, or boiled potatoes placed under slates. These traps must be looked at periodically so that the pests can be collected and destroyed. Much may be done by diligent searching in the early morning or evening. A ring of cinders round choice plants will do a great deal to discourage the attentions of slugs and snails. There are several anti-slug and snail powders on the market; most are very effective.

Woodlice (*Onisidæ*).—These insects are very destructive, especially to seedlings. Indeed, where woodlice abound many persons are often under the impression that the seed has never come up at all. Woodlice congregate in rubbish, at the bottom of pots in a hotbed, and round the sides of wood edgings, fences, and stones. They should be searched for every morning and destroyed by having boiling water poured over them. They may be trapped by means of small flower-pots filled with dry manure or old hay. Powdered borax sprinkled in infested places will also do much to keep down this pest.

Fungus Diseases

In the rock garden these do not assume the importance they do in fruit culture, yet even so, a fungus well established in a patch or pot of plants will wipe them out. This is especially true in the Alpine House, where there is more humidity and less draught than outside, and in frames containing cuttings, where plant life is at its lowest ebb, the young plants not having the virility to fight the pest and overcome it.

Causes.—There are one or two outstanding causes of fungus, the first and the most common being poor culture, that is to say, plants grown weak through quick changes of temperature; over-watering and consequent cessation of root action; dirty glass that does not allow enough light to penetrate it in the dull weather; poor ventilation that keeps the plants hanging with moisture, especially after watering. Another frequent cause of fungus is carelessness in the division of roots in late autumn. Open wounds are left and fungus is allowed to penetrate. This applies to cuttings, more especially as they are very often in a closed frame, an ideal place for attack.

Prevention.—First of all correct any errors in culture. Here lies the great difficulty with alpines, for their foliage, often woolly and lying close to the ground, helps rather than hinders the pest. Plants affected should be watered from below by dipping so that the water does not come in contact with the foliage. A layer of chips on the surface of the soil will also help to keep more air round the neck of the plant and will provide quicker drainage. Keep the plants in as light and airy a position as possible, especially those known to be weakly.

Remedies.—For saxifrages and plants of similar nature and habits a good fungicide is permanganate of potash. In preparing this add sufficient crystals to a pail of water to colour it, and no more; if too strong, the cure may be worse than the disease. The plants should be syringed with this solution on a mild, dull day, repeating the dose in two or three days' time. For cuttings and shrubby plants quite a cheap and efficacious remedy will be found in an occasional dusting with flowers of sulphur.

Soil Fumigation and Sterilization

Fumigation.—Newly-broken land is nearly always infested with wireworms, leather-jackets, and other pests, and a dressing with some soil fumigant, such as naphthalene, gas-lime, or carbide refuse, is invariably necessary.

Soils that have been under cultivation for some time also frequently become pest-ridden. The presence of these pests is indicated by the weak and sickly state of plants whose roots are perhaps attacked. It is in the autumn that most of these pests will be present in the soil; at this time not only those that dwell in the earth all the year round will be found, but those that descend from plants to pass the winter in the soil can also be here destroyed at this period, if properly treated.

For this reason soil fumigants should be used in the autumn or early winter; another reason for application at this time is that seeds and plants cannot, in most cases, be inserted until the fumigants have lain in the soil for at least three months, or they will be damaged. Use the fumigants in December at the latest, therefore, so that planting may be carried out in spring. Where plants are left in or near the soil to be treated, naphthalene will be found the safest fumigant to use, as it can be employed with impunity quite near the stems of plants. Other chemicals must be kept well away from the roots.

Most of the chemicals used are very poisonous and give off gases when exposed to the air and moisture. The fumigant should be applied to the surface of the soil either as a powder or a liquid, as the case may be, and must be dug in at once so that the fumes may be retained in the soil, for they are the chief agencies in destroying the pests.

Fumigants left lying about on the surface for one day even soon lose their strength and efficiency.

Sterilization.—This process consists in burning or heating the soil to such a degree that all pests and seeds of weeds are destroyed and plant-growth is stimulated. Sterilization cannot, save the process of burning to be described later, be applied to any great extent to ground in the open, and is generally confined to soil used in pots.

Plants in sterilized soil will at first be slow in growth, as numbers of the bacteria which promote this are destroyed with the pests. Those remaining, however, are free from the influence of pests and quickly multiply, so that after a time the growth of the plants becomes surprisingly vigorous and rapid. There are several methods of effecting this sterilization ; that by which the largest area can most easily be treated is by :

Burning.—In this method, all available combustible garden refuse, such as straw, hard and fibrous vegetable matter, and leaves, is collected and spread evenly over the soil to be treated. This refuse is set fire to and encouraged to smoulder, rather than to burn fast, so that the process of burning is spread over the longest possible period. This method is best pursued in the late autumn or early winter, at which time the pests will be nearest the surface of the soil. Apart from the sterilization effected by the heat, the ashes will greatly benefit the soil.

Where the area of soil to be treated is not so extensive, other methods can be used.

(1) *Baking.*—Here the soil is placed in a shovel, or is spread thinly on a metal sheet over an open fire, and is heated until the soil cannot be grasped and held in the hand. The moisture will evaporate in steam, but the soil must be removed from the fire before actual smoke appears. After baking, the soil should be well mixed and must have nothing planted in it until two days have elapsed.

(2) *Steaming.*—This is a more difficult process, but a very

effective one. A wooden box is constructed with several parallel pipes running at intervals across the bottom ; these pipes are riddled with holes. The box is filled with soil and covered over the top, and steam at the pressure of 70 lb. to the square inch is forced along the pipes and up through the soil until it is too hot to bear the hand in.

(3) *Scalding.*—When this method is adopted, the pots filled with compost ready for planting have boiling water poured over them until the soil is thoroughly heated all through. They are then well drained and allowed to cool.

A better method, perhaps, is to stand a pail full of the soil in a bath of boiling water and to leave it there until the soil is thoroughly heated through and through ; a fire must be kept burning under the bath or the water will cool.

On a larger scale in the open fumigation is far preferable to sterilization.

SOIL FUMIGANTS

Chemical	Rate of Application	Remarks
Carbide Refuse	30 lb. per square rod	Applied as powder. Useful for small pests.
Carbolic Acid	Mix 2 oz. concentrated acid with each gallon of water. Apply 25 gallons of mixture to each square rod of soil	Applied as liquid from watering-can. Poison ; all liquid should, therefore, be used up.
Formaline	Mix 2 oz. with each gallon of water. Apply 25 gallons of mixture to each square rod of soil	Stir the mixture just before application and use in can. Containers of formaline should be opened in open air, or the operator may be gassed. It is advisable to use a gas-mask during application.
Gas Lime	30 lb. per square rod	A good general fumigant.
Naphthalene	1½ lb. per square rod	Store in air-tight containers. Harmless to plants.
Salt	25 lb. per square rod	Effective for pests at surface only.
Soot	25 lb. per square rod	Should be fresh. Must not touch leaves of plants. Effective for pests at surface only.
Tar	Thin layer over soil	Excellent for all soil pests. Do not dig in until the tar has lain on the surface for some 3 weeks.

NOTE.—2 lb. to the square rod equals 1 oz. to the square yard.

FUMIGATION OF ALPINE HOUSE

The best time for this important operation in the Alpine House is the evening in calm, fine weather, or in the morning on a dull, windless day. To prepare a house for fumigation, shut all ventilators, and cover with damp matting all broken or cracked lights and all roof ventilators which are likely to leak at all. Where convenient, plants which are in full flower should be removed during the actual process. Most gardeners will find the fumigating or vaporizing materials sold ready for use, with the necessary apparatus for burning, highly satisfactory ; the makers give detailed instructions which should be closely followed. Where the house is badly infested with any insect pest, it should be dealt with two or three times on successive evenings ; this is almost always necessary when extirpating red spider. The next morning, or when the fumes have thoroughly cleared, open the doors and ventilators and go round the house with the syringe and warm soft water, and free all plants from dead insects.

INSECTICIDES AND FUNGICIDES

When and How to Use Them

Preparation	How to Make	How to Apply	Principal Use
Lime Wash	Slake 6 lb. of quicklime with a little water, then dilute to 5 gallons. See that the lime is not air-slaked before use. Stir well	A good insecticide, also an excellent cleansing wash. Strain two or three times before use in sprayer	Aphides, lichen, and mosses.
Nicotine Emulsion	Boil ½ lb. soft soap and 1 quart tobacco extract in a little water, dilute to make 3 gallons with water (*Poison*)	Reliable insecticide for use at all times. Apply as coarse spray	Aphides, cuckoo-spit, green-fly, leaf-miner moth, mealy bug, saw-fly grubs, caterpillars, etc.
Quassia Emulsion	Steep 1 lb. quassia chips in 1 gallon water for 12 hours, melt ½ lb. soft soap and add ; make up to 8 gallons with water	For use in warm weather after showers	Aphides, green-fly, hop aphis, red spider, rose beetle, and woolly aphis.

CHAPTER XIV

LISTS OF PLANTS SUITABLE FOR VARIOUS SITUATIONS AND PURPOSES

THE ROCK GARDEN

Rock Plants for Sunny Sites

Acæna (New Zealand Burr)
Acantholimon (Prickly Thrift)
Achillea (Milfoil)
Æthionema (Burnt Candytuft)
Alchemilla (Lady's Mantle)
Allium
Aloysia nodiflora (Lippia)
Alyssum (Rock Madwort)
Anagallis (Pimpernel)
Anchusa (Alkanet)
Andromeda (Marsh or Wild Rosemary)
Androsace (Rock Jasmine)
Antennaria
Anthemis (Chamomile)
Anthyllis (Kidney Vetch)
Antirrhinum (Snapdragon)
Arabis (Rock Cress)
Arenaria (Sandwort)
Armeria (Thrift)
Arnebia (Prophet Flower)
Asperula (Woodruff)
Aster (Starwort)
Astragalus (Milk Vetch)
Aubrietia (Rock Cress)
Bellis (Daisy)
Brachycome (Swan River Daisy)
Bryanthus
Bulbocodium (Spring Meadow Saffron)
Cacti (Hardy)
Calamintha alpina (Calamint)
Calandrinia (Rock Purslane)
Callirhoë involucrata
Calluna (Ling-Heather)
Calochortus (Butterfly Tulip, etc.)
Campanula (Bellflower)
Celmisia
Centranthus (Valerian)
Cerastium (Mouse-ear, etc.)
Ceratostigma (Leadwort)
Cistus (Rock Rose)
Codonopsis
Colchicum (Meadow Saffron)
Crocus
Crucianella stylosa
Cytisus
Daffodils
Dicentra (Bleeding Heart)
Draba
Drosera (Sundew)
Echeveria
Edelweiss
Erigeron (Fleabane)
Eritrichium
Erysimum (Fairy Wallflower)
Erythræa diffusa
Eschscholzia (Californian Poppy)
Euphorbia (Spurge)
Forget-me-not (Myosotis)
Frankenia (Sea Heath)
Genista (Furze, etc.)
Gentiana acaulis, G. pneumonanthe, and G. sino-ornata
Geranium (Dwarfs)
Geum
Globularia (Globe Daisy)
Gypsophila
Hedysarum alpinum, boreale, etc.
Helianthemum (Rock Rose)
Helichrysum (Everlasting Flowers)
Herniaria
Heuchera (Alum Root)
Hieracium (Hawkweed)
Horminium pyrenaicum
Hyacinthus azureus, etc.
Hypericum (St. John's Wort)
Ice Plant (Mesembryanthemum crystallinum)
Incarvillea
Iris (Various)
Ixia (African Corn Lily)
Ixiolirion (Ixia Lily)
Jasione (Sheep's Scabious)

Leiophyllum buxifolium (Sand Myrtle)
Lewisia (Bitter-root)
Linum (Flax)
Lithospermum (Gromwell)
Lobelia
Lotus (Bird's-foot Trefoil)
Lychnis (Campion)
Magnolia
Mazus
Morina (Whorl Flower)
Morisia hypogœa (Mediterranean Cress)
Muscari (Grape Hyacinth)
Narcissus
Nepeta (Catmint)
Nierembergia (Cup Flower)
Œnothera (Evening Primrose)
Ononis rotundifolia, etc. (Rest Harrow)
Onosma (Alpine Comfrey)
Origanum (Marjoram)
Papaver alpinum and nudicaule (Poppy)
Paronychia
Pentstemons (Dwarf)
Philadelphus (Mock Orange, Syringa)
Phormium (New Zealand Flax)
Phyteuma (Horned Rampion)
Pinks (Dianthus)
Portulaca (Purslane)
Pratia
Prunella (Self-heal)
Puschkinia (Striped Squill)
Rhododendrons (Bagshot Ruby, The Bride, Pink Pearl, etc.)
Roses
Rosmarinus officinalis (Rosemary)
Sagina (Pearl-wort)
Sanguinaria (Blood-root)
Santolina (Lavender Cotton)
Saponaria (Soapwort)
Sarracenia (Huntsman's Horn)
Saxifraga (most varieties)
Scilla (Squill)
Sedum (Stonecrop)
Sempervivum (Houseleek)
Silene (Campion and Catchfly)
Statice (Sea Lavender)
Sternbergia (Winter Daffodil)
Teucrium (Germander)
Thalictrum (Meadow Rue)
Thymus (Thyme)
Tigridia (Tiger Iris)
Tropæolum polyphyllum
Tulips (Dwarf)
Tunica Saxifraga
Valeriana
Veronica
Viburnum
Vinca
Virginian Stock
Wahlenbergia (Tufted Harebell)
Wallflowers
Zauschneria (Californian Fuchsia)

Rock Plants for Shady Sites

Acæna (New Zealand Burr)
Adonis (Pheasant's Eye) (Partial-shade)
Anemones (Semi-shade)
Aquilegia (Columbine)
Astrantia (Masterwort)
Auriculas (Alpine)
Calceolarias (Dwarf Shrubby) (Partial-shade)
Campanulas (Partial-shade)
Cassiope tetragona (Semi-shade)
Chionodoxa (Glory of the Snow)
Chrysogonum virginianum (Golden Knee)
Cortusa matthioli (Bear's Ear) (Partial-shade)
Corydalis (Fumitory)
Cotula
Cotyledon (Pennywort)
Crocus
Cyananthus lobatus, etc.
Cyclamen
Cypripedium (Lady's Slipper) (Semi-shade)
Daffodils (Partial-shade)
Daphne blagayana, D. cneorum, etc.
Deutzia discolor, D. gracilis, etc. (Partial-shade)
Dodecatheon (American Cowslip)
Dog's Tooth Violet (Partial-shade)
Douglasia lævigata, etc.
Dracocephalum (Dragon's Head)
Dryas (Mountain Avens) (Partial-shade)
Epimedium (Barrenwort)
Eranthis (Winter Aconite)
Erica (Heath) (Semi-shade)
Ferns (Hardy)
Fritillaria
Funkia (Plantain Lily)
Gaultheria (Winter Green) (Partial-shade)
Gentiana (Most species) (Partial-shade
Haberlea
Hemerocallis (Day Lily)
Ionopsidium (Violet Cress)
Iris (Some vars.) (Partial-shade)
Leucojum (Snowflake) (Semi-shade)
Linaria (Toad Flax) (Semi-shade)
Lonicera (Honeysuckle)
Lythrum (Purple Loosestrife)
Maianthemum
Meconopsis
Mertensia (Lungwort)
Mimulus (Musk or Monkey Flower

Mitraria (Mitre Flower) (Semi-shade)
Narcissus (Partial-shade)
Nertera (Coral-berried Duckweed)
Olearia (New Zealand Daisy Bush)
Omphalodes (Rock Forget-me-not)
Orchids (Hardy) (Partial-shade)
Ornithogalum (Star of Bethlehem)
Ourisia
Oxalis (Cape Shamrock) (Semi-shade)
Pinguicula (Butterwort or Bog Violet)
Platycodon (Chinese Bellflower)
Polygala (Milkwort) (Partial-shade)
Primula (Most vars.) (Partial-shade)
Pulmonaria (Lungwort)
Ramondia (Pyrenean Primrose)
Ranunculus (Partial-shade)
Rubus
Saxifraga (Some vars.)
Schizocodon
Sedum (Some vars.) (Partial-shade)
Shortia (Crimson Leaf)
Sibthorpia
Snowdrops (Galanthus)
Soldanella (Moonwort)
Thalictrum (Meadow Rue)
Tiarella cordifolia (Foam Flower)
Trientalis (Star Flower)
Trollius (Globe Flower)
Violas (Most vars.)
Vittadenia triloba

Early Bloom in the Rock Garden

Adonis vernalis
Anemone apennina
  A. blanda
Asarum europæum
Chionodoxa sardensis (Glory of the Snow)
Crocus (various)
Cyclamen (some varieties)
Draba (various)
Erica carnea, etc.
Erysimum pulchellum
Fritillaria aurea
Gentiana (various)
Helianthemum (Sun Rose)
Hepatica
Hyacinthus azureus
Iris histrioides (Netted Iris), I. persica, I. Heldreichi, I. reticulata, I. Krelagei, I. stylosa
Muscari botryoides (Grape Hyacinth)
Myosotis (Forget-me-not)
Narcissus (various)
Omphalodes verna (Creeping Forget-me-not)
Phlox (Dwarf Alpine)
Primula (various)
Saponaria ocymoides (Soapwort)
Saxifraga (various)
Scilla bifolia (Squill)

Summer Bloom in the Rock Garden

* Denotes plants which commence flowering in the Early Summer.

Acæna glauca (New Zealand Burr)
Achillea argentea (Milfoil)
  A. tomentosa
*Æthionema (various)
*Alyssum montanum (Rock Madwort)
  A. saxatile compactum
Anchusa myosotidiflora
Androsace lanuginosa
  A. carnea
Anthyllis montana
*Aquilegia glandulosa (Columbine)
*Arabis (various) [Rock Cress]
Arenaria (various) [Sandwort]
Armeria cæspitosa (Thrift)
*Asperula odorata
Aster alpinus
*Aubrietia (various)
Calandrinia umbellata
Campanula (various) [Bellflower]
Cerastium tomentosum
Ceratostigma plumbaginoides
*Cheiranthus (various) [Wallflower]
*Cornus canadensis
Coronilla cappadocica
Cyclamen (Hardy vars.)
*Cytisus kewensis, etc.
Dianthus (various) [Pinks]
*Dicentra formosa
*Dodecatheon (American Cowslip)
*Draba (various)
Dryas octopetala, etc.
*Epimedium alpinum
*Erinus alpinus (vars.)
*Erodium (various) [Crane's Bill]
*Erysimum pulchellum
Euphorbia Myrsinites
Gaultheria procumbens
*Genista pilosa
*Gentiana (various) [Gentian
Geranium (various)
Geum (various)
Globularia trichosantha
*Gypsophila repens
*Helianthemum (Sun Rose)
Helichrysum bellidioides
*Hepatica

Heuchera sanguinea and vars.
Hypericum (various) [St. John's Wort]
*Iberis (Candytuft)
*Iris (various)
Leontopodium alpinum (Edelweiss)
Linaria alpina (Toad Flax)
Linum (various) [Flax]
Lithospermum prostratum (Gromwell)
*Lychnis alpina (Campion)
Macrotomia echioides
Maianthemum bifolium
Mazus pumilio
Mertensia primuloides
*Morisia hypogœa
Myosotis (Forget-me-not)
*Nepeta Mussinii
Nierembergia rivularis (White Cup)
Ononis rotundifolia
Onosma taurica
Origanum pulchrum
*Ourisia coccinea
Oxalis enneaphylla
Papaver alpinum
Platycodon Mariesii
*Polemonium reptans
Polygala chamæbuxus
Potentilla (various)
*Pulmonaria (various)
*Ramondia (Pyrenean Primrose)
*Ranunculus
Saponaria ocymoides (Soapwort)
*Saxifraga (various)
Sedum (various) [Stonecrop]
Sempervivum (various)
Silene (various) [Catchfly]
*Soldanella alpina
Thalictrum adiantifolium
Thymus (various)
Tunica saxifraga
Veronica (Speedwell)
Viola (various)
Vittadenia triloba
*Waldsteinia trifolia
*Weldenia candida
Wulfenia carinthiaca
Zauschneria californica splendens

Late Bloom in the Rock Garden

Calandrinia umbellata
Ceratostigma plumbaginoides
Crassula sarcocaulis
Crocus (various)
Dabœcia polifolia (St. Dabeoc's Heath)
Erodium (various) [Crane's Bill]
Gypsophila repens
Helichrysum bellidioides
Leontopodium alpinum (Edelweiss)
Lithospermum prostratum (Gromwell)
Nepeta Mussinii
Œnothera (various)
Ourisia coccinea
Oxalis enneaphylla
Polygonum (various)
Ramondia (Pyrenean Primrose)
Ranunculus
Saxifraga (various)
Sedum (various) [Stonecrop]
Scutellaria (various)
Sempervivum (various)
Silene (various)
Thalictrum adiantifolium
Tunica saxifraga
Vittadenia triloba
Zauschneria californica splendens

Rock Plants of Creeping and Trailing Habit

Acæna (New Zealand Burr)
Achillea (Milfoil)
Alyssum
Androsace (Rock Jasmine)
Antennaria
Antirrhinum Asarina, A. glutinosum, etc. (Snapdragon)
Arabis (Rock Cress)
Arctostaphylos Uva-ursi
Arenaria (Sandwort)
Astragalus alpinus (Milk Vetch)
Aubrietia (Rock Cress)
Borrago laxiflora (Borage)
Bryanthus
Calandrinia umbellata (Rock Purslane)
Callirhoë involucrata
Campanula (Some vars.)
Cerastium
Cotoneaster (Trailing vars.)
Cotula dioica and C. squalida
Cyananthus lobatus, etc.
Cytisus kewensis, etc. (Broom)
Dryas (various) [Mountain Avens]
Galax aphylla (Fairies' Wand)
Gaultheria nummularioides, G. procumbens, etc. (Winter Green)
Genista (Some vars.)
Helianthemum (Rock Rose)
Helxine
Herniaria
Linaria cymbalaria, etc. (Toad Flax)
Linnæa (Twin-flower)
Lithospermum (Gromwell)
Loiseleuria decumbens (Trailing Azalea)

Lysimachia nummularia and L. nemorum (Creeping Jenny, etc.)
Mazus
Mimulus radicans (Creeping Musk)
Nertera (Coral-berried Duckweed)
Nolana (Chilian Bell-flower)
Omphalodes (Creeping or Rock Forget-me-not)
Ourisia
Paronychia
Polygonum affine (syn. P. Brunonis, etc.)
Pratia
Rosa alpina, R. pyrenaica, etc.
Rosmarinus officinalis prostrata
Sagina (Pearl-wort)
Saponaria (Soapwort)
Saxifraga (Some vars.)
Sedum (Stonecrop)
Sibthorpia
Thymus (Thyme)
Tropæolum polyphyllum
Veronica prostrata

Rock Plants with Evergreen Foliage

Abelia chinensis (Rock Abelia)
Acæna Buchanani, etc. (New Zealand Burr)
Acantholimon (Prickly Thrift)
Alchemilla (Lady's Mantle)
Andromeda (Marsh or Wild Rosemary)
Arabis (Rock Cress)
Arctostaphylos Uva-ursi (Bearberry)
Arenaria balearica, A. cæspitosa, etc. (Sandwort)
Armeria (Thrift)
Artemisia alpina, etc. (Old Man)
Asperula (Woodruff)
Bruckenthalia spiculifolia
Bryanthus (Phyllothamnus)
Calluna (Ling-Heather)
Cassiope tetragona
Cistus (Rock Rose)
Dabœcia (Irish Heath)
Draba (Whitlow Grass)
Dryas (Mountain Avens)
Erica (Heath or Heather)
Erinus alpinus (Summer Starwort)
Frankenia (Sea Heath)
Galax aphylla (Fairies' Wand)
Garrya elliptica (Californian Garrya)
Gaultheria nummularioides, G. procumbens, etc. (Winter Green)
Genista (Furze, Gorse)
Gentiana acaulis, etc. (Gentian)
Helianthemum (Rock Rose)
Hypericum Coris, etc. (St. John's Wort)
Iberis sempervirens, etc. (Candytuft)
Leiophyllum buxifolium (Sand Myrtle)
Linnæa (Twin Flower)
Lithospermum (Gromwell)
Mitraria (Mitre Flower)
Osmanthus Delavayi
Pernettya (Prickly Heath)
Phlox subulata and vars. (Moss Pink)
P. verna (syn. P. reptans)
Pieris (Lily of the Valley Bush)
Pinks (various) [Dianthus]
Ramondia (Pyrenean Primrose)
Rhodothamnus chamæcistus
Rosmarinus officinalis (Rosemary)
Santolina (Lavender Cotton)
Saxifragas (Most species)
Schizocodon soldanelloides
Sedum (Most species) [Stonecrop]
Sempervivums (Houseleek)
Shortia (Crimson Leaf)
Silene acaulis, etc. (Moss Campion)
Sisyrinchium (Satin Flower)
Soldanella (Moonwort)
Veronica (Dwarf Shrubby vars.)
Vinca (Periwinkle)
Wallflowers

Rock Plants with Silvery or Variegated Foliage

Achillea (Milfoil)
Alchemilla (Lady's Mantle)
Alyssum argenteum, A. saxatile, etc.
Androsace (Rock Jasmine)
Antennaria
Anthemis (Chamomile)
Arabis (Some vars.) [Rock Cress]
Artemisia lanata, etc. (Old Man)
Asperula suberosa (Woodruff)
Cerastium tomentosum (Mouse-ear)
Erica (Heath)
Erodium (Some vars.)
Ivy (Hedera) [Some vars.]
Nepeta Mussinii
Pinks (Dianthus—Tufted)
Santolina chamæcyparissus
Saxifraga (Some vars.)
Sedum glaucum, etc.
Tropæolum polyphyllum
Veronica decumbens, V. incana, etc.

Rock Plants needing the Protection of Sheet of Glass in Winter

Acantholimon venustum
Achillea (Milfoil)
Adonis amurensis
Androsace (Most vars.) [Rock Jasmine]
Antirrhinum Asarina and trailing vars.
Arabis androsacea
Arnebia echioides
Asperula (Woodruff)
Cacti (Hardy)
Campanula garganica hirsuta
Celmisia
Edelweiss
Eritrichium nanum
Erodium chrysanthum and E. petræum
Helichrysum
Hypericum Coris and H. tomentosum
Lewisia (Bitter-root)
Lychnis (Campion)
Onosma (Alpine Comfrey)
Papaver alpinum
Pinks (Dianthus, Tufted species)
Potentilla villosa
Saxifragas (Cushion and Encrusted vars.)
Sedum (Smaller kinds)
Sempervivum arachnoideum (Cobweb Houseleek)
Silene acaulis
Soldanella (Moonwort)
Wahlenbergia

Rock Plants which Hate Lime

Andromeda (Marsh or Wild Rosemary)
Androsace carnea, A. Chumbyi, and A. lanuginosa
Anemone nemorosa and A. sulphurea
Arctostaphylos Uva-ursi
Asperula suberosa
Azaleas
Bryanthus
Calluna (Ling-Heather)
Campanulas (Most Alpine vars.)
Claytonia (Spring Beauty)
Dabœcia (Irish Heath)
Dodecatheon (American Cowslip)
Erica (except E. carnea) [Heath or Heather]
Ferns—Adiantum and Polypodium
Gaultheria (Winter Green)
Haberlea
Kalmia (American Laurel)
Ledum buxifolium
Linnæa (Twin Flower)
Lithospermum prostratum (var. Heavenly Blue)
Lychnis alpina (Campion)
Meconopsis
Pernettya (Prickly Heath)
Phyteuma (Horned Rampion)
Pieris (Lily of the Valley Bush)
Pinguicula (Butterwort or Bog Violet)
Pinks (Dianthus glacialis and D. neglectus)
Primula glutinosa and P. viscosa
Rhododendrons (Most vars.)
Sempervivum arachnoideum (Cob-web Houseleek)
Sisyrinchium (Satin Flower)
Zenobia speciosa, etc.

Lime Lovers

Acantholimon (Prickly Thrift)
Achillea (Milfoil—Silvery Foliage vars.)
Æthionema (Burnt Candytuft)
Alchemilla (Lady's Mantle)
Alyssum montanum and A. saxatile
Androsace arachnoidea, A. foliosa
Anemone alpina and A. pulsatilla
Antirrhinum Asarina
Aquilegia (Columbine)
Astragalus (Milk Vetch)
Centranthus (Valerian)
Cistus (Rock Rose)
Cyclamen
Dryas (Mountain Avens)
Edelweiss
Erica carnea (only) (Heath)
Erodium chrysanthum
Gentiana (Gentian)
Geranium argenteum
Gypsophila
Ivy (Hedera)
Lewisia (Bitter-root)
Linum salsoloides
Lithospermum Gastonii (Gromwell)
Lychnis pyrenaica
Papaver alpinum and P. nudicaule (Poppy)
Phlox subulata and vars. (Moss Pink)
Pinks (Some vars. Dianthus)
Primulas (Most varieties)
Sedum (Stonecrop)
Sempervivum (except S. arachnoideum)
Sternbergia (Winter Daffodil)
Tulips (Dwarf vars.)
Wahlenbergia (Tufted Harebell).
Wallflowers

Peat Lovers

Adonis (Pheasant's Eye)
Andromeda (Marsh or Wild Rosemary)
Bruckenthalia speculifolia
Cacti (Hardy)
Calceolarias
Conandron ramondioides
Cyananthus lobatus
Dabœcia (Irish Heath)
Daphne alpina, D. cneorum
Epimedium (Barrenwort)
Eritrichium nanum
Galax aphylla (Fairies' Wand)
Gentiana (Gentian)
Haberlea
Iris (Most vars.)
Mertensia (Lungwort)
Mitraria (Mitre Flower)
Onosma (Alpine Comfrey)
Orchids (Hardy) [Most vars.]
Oxalis (Cape Shamrock)
Pernettya (Prickly Heath)
Phlox subulata and vars. (Mossy Phlox)
Pinguicula (Butterwort, Bog Violet)
Primulas (Some vars.)
Pyrola (Winter Green)
Ramondia (Pyrenean Primrose)
Rodgersia
Saxifragas (Some vars.)
Shortia (Crimson Leaf)
Wulfenia
Zenobia speciosa

THE WALL GARDEN

Plants for Sunny Sites in the Wall Garden

Acæna Buchanani and A. microphylla
Acantholimon glumaceum
Achillea tomentosa (Semi-shade)
Æthionema grandiflorum
Alyssum alpestre, A. *montanum and* A. saxatile
Androsace (Moderate Sun)
Antirrhinum (various)
Arabis albida fl. pl. and A. androsacea
Arenaria balearica
Asperula Gussonii
Aster alpinus (Starwort)
Astragalus danicus albus
Aubrietia (various)
Campanula (various)
Centranthus ruber
Cerastium tomentosum
Cheiranthus (various) [Wallflower]
Dianthus (various) [Pinks]
Draba aizoon, etc. (Moderate Sun)
Erigeron mucronatus, etc.
Erinus alpinus
Erodium (various)
Gypsophila prostrata and G. repens
Helianthemum
Helichrysum bellidioides
Hypericum (various)
Iberis sempervirens (Candytuft)
Leontopodium alpinum (Edelweiss)
Lewisia rediviva
Linaria alpina, etc. (Sun or Shade)
Linum alpinum
Lithospermum (Gromwell)
Lychnis alpina
Morisia hypogœa (Moderate Sun)
Nepeta Mussinii
Œnothera missouriensis, etc.
Onosma tauricum
Origanum pulchrum
Phlox subulata
Phyteuma comosum
Primulas (various)
Santolina incana
Saponaria cæspitosa, etc.
Saxifraga (various)
Sedums
Sempervivums
Silene alpestris, etc.
Teucrium Polium, etc.
Tunica saxifraga
Veronica Guthreana, etc.
Wahlenbergia
Zauschneria

Plants for Shady Sites in the Wall Garden

Acæna Buchanani and A. microphylla
Achilla tomentosa (Semi-shade)
Androsace (Semi-shade)
Aquilegia (various) (Partial-shade)
Arenaria balearica, A. cæspitosa
Campanula (various) (Partial-shade)
Cerastium tomentosum (Semi-shade)
Cortusa matthioli (Partial-shade)
Corydalis lutea
Cotyledon umbilicus
Digitalis (Foxgloves)
Erinus alpinus
Ferns
Haberlea
Linaria alpina, etc. (Semi-shade)
Mertensia primuloides
Primula Allionii, P. auricula, **P. viscosa**, etc.
Ramondia pyrenaica
Saxifraga (Mossy vars.)
Tunica saxifraga

Plants for a Dry Site on a Wall

- Acantholimons
- Achillea tomentosa
- Æthionema grandiflorum
- Anthyllis montana
- Antirrhinums
- Armeria
- Artemisia
- Campanula (Some vars.)
- Centranthus ruber
- Cheiranthus (Wallflowers)
- Cotyledon simplicifolia
- Dianthus (various) [Pinks]
- Erodiums
- Gypsophila prostrata and G. repens
- Helianthemums
- Iberis sempervirens (Candytuft)
- Lewisia rediviva
- Linum alpinum
- Lithospermum
- Micromeria
- Nepeta Mussinii
- Onosma
- Pyrethrum densum
- Santolina incana
- Saponaria ocymoides
- Sedums
- Sempervivums
- Zauschneria californica

Plants for a Moderately Dry Site on a Wall

- Acænas
- Alyssums
- Androsace lanuginosa
- Arabis
- Aubrietias
- Cerastium tomentosum
- Dianthus (Pinks)
- Dryas
- Helianthemums
- Heucheras
- Iberis (Some vars.) [Candytuft]
- Polygonum
- Saxifraga (various)
- Silene (Some vars.)
- Thymus (various)
- Veronica

Plants for a Moist Site on a Wall

- Aquilegia
- Arenaria balearica
- Eranthis (Winter Aconite)
- Eritrichium nanum
- Forget-me-not
- Geum reptans and G. rivale
- Haberlea
- Mertensia primuloides
- Primulas
- Ramondia
- Saxifraga (Mossy)
- Soldanella
- Waldsteinias

Plants for Positions on Top of Walls

- Acantholimon glumaceum
- Achillea tomentosa
- Alyssum alpestre, etc.
- Antirrhinums (various)
- Arabis
- Arenaria balearica
- Asperula Gussonii
- Aster alpinus (Starwort)
- Aubrietia (various)
- Campanula (various)
- Cheiranthus (Wallflowers)
- Cotyledon umbilicus
- Dianthus (various) [Pinks]
- Erodium (various)
- Helianthemum (various)
- Linaria alpina, etc.
- Linum alpinum
- Lychnis alpina
- Phlox subulata
- Santolina incana
- Saxifraga (Mossy)
- Sedums
- Sempervivums
- Zauschneria

Plants to Hang Down from the Upper Parts of a Wall

- Æthionema grandiflora
- Alyssum alpestre, A. montanum, etc.
- Androsace (various)
- Antirrhinum (Trailing vars.)
- Arabis albida fl. pl., etc.
- Arenaria balearica
- Astragalus danicus albus
- Aubrietia (various)
- Campanula (various)
- Erinus alpinus
- Gypsophila prostrata and G. repens
- Helichrysum bellidioides
- Iberis sempervirens (Candytuft)
- Lithospermum prostratum
- Œnothera missouriensis, etc.
- Saponaria ocymoides
- Thymus citriodorus and T. serpyllum coccineus
- Tunica saxifraga
- Wahlenbergia serpyllifolia

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